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MONTANA

STRATEGY

FOR A

LIVABLE

ENVIRONMENT

CONFERENCE PROCEEDINGS

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A MONTANA STRATEGY FOR A LIVABLE ENVIRONMENT

FOREWARD

by

C. W. Brinck

The conference "A Montana Strategy for a Livable Environment" represents an effort by the people of Montana to study where we are going in the environment in Montana.

The speakers, representing various interests, were selected to give an overview of many aspects of the environment.

Attendance at the conference was by invitation and was designed to bring together in a single group widespread opinions from persons who are leaders in their individual organizations. This conference was sponsored by the State Department of Health who is very much interested in all phases of the environment. The papers, however, represent the thinking of Montana people outside the State Department of Health. The opinions expressed at the conference will serve as guides to State agencies and others concerned with the environment.

All participants in this conference could be recognized; however, to make this more readable, I would like to recognize the three that were primarily responsible for the success of the conference: Mr. George Darrow, Petroleum Geologist and Yellowstone County, District 9 Representative; Doctor M. J. Nakamura, Chairman and Professor of Microbiology, University of Montana, Missoula; and Doctor William Walter, Professor of Microbiology, Montana State University, Bozeman. Without the encouragement, assistance and guidance of these three men, it is doubtful that the conference would have been the success that it was.

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MONTANA'S STRATEGY FOR A LIVABLE ENVIRONMENT

May 21, 22, 23, 1968

Capitol Building, Helena, Montana

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Today, Montana's as well as the nation's air, water and land are being contaminated faster than nature and man's present efforts can cleanse them.

But even of greater concern are the undetected environmental health hazards, either alone or with the known hazards, that can arise suddenly to create conditions of living that are harmful, if not dangerous to the public. It is necessary then that a constant effort be made to detect these hazards before they reach a crisis stage and to keep a continuous vigil to keep known hazards under control.

In view of the above, this Statewide Conference is being held to consider "Montana's Strategy for a Livable Environment."

Sponsored by: Montana State Department of Health.

Goals of the Conference:

To attempt to set forth the problems and try to establish a guide as to where we might be going in the environment in Montana.

Conference

A MONTANA STRATEGY FOR A LIVABLE ENVIRONMENT

HOUSE OF REPRESENTATIVES' CHAMBERS

HELENA, MONTANA

May 21, 1968

- 10:00 a.m. Registration
OPENING SESSION—C. W. Brinck, Presiding
- 1:30 p.m. Welcome Address
—Honorable Governor Tim Babcock
- 1:40 p.m. Keynote Address
—Jerome H. Svore, Director
National Center for Urban and Industrial Health, Public
Health Service
- 3:00 p.m. Break
- 3:30 p.m. "Montana's Choice: Unique Quality or Common Tragedy?"
—Honorable George Darrow
- 4:30 p.m. Recess
- 7:30 p.m. Recreation in the Environment
—Richard Konezeski, Ph.D.
—Robert Cooney
- 8:30 p.m. Group Discussion — Rooms to be assigned.

May 22, 1968

William Walter, Ph.D. — Presiding

- 9:00 a.m. Air in the Environment
—Richard Solberg, Ph.D.
—R. Lewis Brown, Jr.
- 9:40 a.m. Consumer Protection
—(Mrs.) Marjorie Keiser, Ph.D.
- 10:20 a.m. Break
- 10:45 a.m. Air in the Environment Group Discussions
Consumer Protection Group Discussions
- 11:45 a.m. Recess

May 22, 1968

(Afternoon)

J. Mitsura Nakamura, Ph.D. — Presiding

- 1:30 p.m. Water in the Environment
—Richard McConnen
—Everett Darlinton
- 2:10 p.m. Disease in the Environment
—Herbert G. Stoenner, D.V.M.
—John W. Jutila, Ph.D.
- 2:50 p.m. Break
- 3:20 p.m. Water in the Environment Group Discussions
Disease in the Environment Group Discussions
- 4:30 p.m. Recess

May 22, 1968

(Evening)

- 6:00 p.m. Social Hour — Montana Club (No Host)
- 7:00 p.m. Dinner — Montana Club (No Host)
Film — "Sun River"

May 23, 1968

C. W. Brinck — Presiding

- 9:00 a.m. Panel Discussion:
Recreation versus Industry for Montana
—Charles Bradley, Ph.D.
—Richard Setterstrom
—Arnold Bolle, D.P.A.
Don Weaver, Ph.D.
- 10:00 a.m. Break
- 10:30 a.m. Summary of Conference
—Roy E. Huffman, Ph.D.
- 12:00 a.m. Adjourn



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HONORABLE TIM BABCOCK
Governor of Montana

Address of Welcome

GOVERNOR TIM BABCOCK

I want to take this opportunity to welcome those of you who have come to Montana to attend this conference. We hope you will enjoy your visit to the Big Sky Country.

I welcome again many of my friends from around the state who have come here today to participate in a conference that I have long felt we needed.

A great deal of benefit to Montana will . . . I am sure . . . come out of this meeting. I want to publicly pass along my congratulations to the Montana State Department of Health for organizing this meeting.

The problems which you will discuss during the next three days are of the most fundamental importance, not only to Montana, but to the nation as well. On the inside cover of the conference program is a sentence which says: "Today, Montana's as well as the nation's air, water and land are being contaminated faster than nature and man's present efforts can cleanse them."

We in Montana are particularly proud of the environmental assets of our state. In addition to clear air, we are fortunate to have an abundance of clean water and natural resources which make us the envy of those people who by circumstance find themselves living in metropolitan areas devoid of these desirable traits.

Certainly one of the aims of this conference is to find answers to some of the problems that do present themselves in our continuing effort to keep Montana's environment livable.

I would add only one cautionary note. In our zeal to find solutions let us not create other problems which would over-shadow our achievement. To avoid this pitfall, let us examine carefully each suggested action and in so doing prevent the possibility of an equal or more dangerous reaction.

Many areas of this country are now over-populated and beset with a multitude of problems. These sections of the country once enjoyed many of the environmental assets that we in Montana have always enjoyed. These assets were in fact what attracted many people. Now, however, the problems they face have come about through lack of foresight and poor planning.

A study of the growth patterns of our country shows that with the east and west coasts becoming more and more saturated, the trend in future years will be internal—toward the midwest. In fact that trend is already underway.

It is of the utmost importance that Montana recognize this inevitable movement and that we start preparing now for the future. I am sure some of your speakers will touch on this very subject.

I noticed in the conference program that one of the topics of a panel discussion Thursday is "Recreation versus Industry for Montana." Certainly there are times when these two areas will come in conflict. However, with careful and logical planning, we can keep such conflicts to a minimum.

Montana is unique in its appeal to industry. The living conditions as I have mentioned are ideal. There are, of course, economic considerations any industry must meet when seeking a location. We must

anticipate what those considerations are as well as the recreational assets of our state. Then we can attract the kind of industry which enhances rather than detracts from our environment. Again, I believe these are subjects which will be thoroughly discussed by you during the next few days.

I wish all of you success in this conference. Its outcome could, and undoubtedly will, have a profound effect on Montana for many years to come. My office and staff will be available at all times to offer whatever assistance we can to see that the conference reaches its goals.

Once again, let me welcome you to Helena and to Montana. It is a delight to have you here.



JEROME H. SVORE

*Director, National Center
for Urban and Industrial
Health, Public Health Service*

A Better Environment Through Planning

HONORABLE JEROME H. SVORE

ABSTRACT

Montana cannot escape the environmental health hazards of our times. Like the great cities of this country, it must deal with the problems of substandard housing, air and water pollution, occupational disease, and in some places, the beginning stages of urban blight.

Measures already are being taken to cope with some of these problems in Montana. It is most important, however, that a sufficient effort be made now to reverse any trends toward degradation before irreparable damage is done to what is still one of nature's most beautiful areas.

On the national front, the National Center for Urban and Industrial Health is operating programs concerned with a large number of environmental health problems; injury control, occupational health, solid wastes, environmental sanitation in our housing, in milk and food protection, in urban planning, and in our water supply.

A partnership in the quality control of the environment among federal, state, and local health agencies is a must if man is to maintain a livable environment.

* * * * *

It is always a pleasure to be back in this part of the country again. While we lived in North Dakota, western Montana was frequently our vacation spot.

Coming back here today from Cincinnati, the ghettos, the riots, the noise and general urban environmental pollution seem distant and somewhat unreal. You almost forget how nice it can be here. Sunday we drove along the east shore of Flathead, turned right at Bigfork, on down past Swan Lake through Seeley. What a beautiful part of nature you have to offer and I could not help but wonder, will you keep it that way? Nevertheless, you do have problems and the contamination of the Montana environment is becoming more common. Each of you, I am sure, can pinpoint the time and place of some lack of environmental quality management in this beautiful state of yours.

Just about every problem that our new National Center for Urban and Industrial Health deals with is found in some form or other in Montana. I can also add to that list the matter of air pollution and radiological health which are the responsibility of two other centers in our Bureau.

Let me select one example of mutual concern—namely, housing hygiene. This problem is becoming increasingly important in our ghettos. It may seem strange to some Montanans but it is your problem too. You may not have what you consider a ghetto but I am sure you do have substandard housing. In fact, in many states you will find most of the dilapidated homes are rural. I will comment further on this later.

What about air pollution? Severe smoke and gas emission recently produced by a phosphates company here in Montana demonstrated the need for a control program. In this case it caused damage to both livestock and crops. As a result, the first intra-state air pollution abatement conference was held in August of last year under the provisions of the Clean Air Act which encourages and supports regional conferences dealing with air pollution problems. Based on the recommendations of that conference, the phosphates company closed its plant to install temporary pollution control equipment. I do not have the latest information on this, but apparently the matter is not yet settled.

Water pollution control also merits consideration. With hard rock mining and metal processing being one of your major industries you are bound to have regions with severe problems of water pollution. However, I am glad to see that steps are being taken toward abatement. Industry itself is spending millions of dollars to build waste ponds to take care of the stream pollution. One company, as many of you know, has already invested between \$21 and \$23 million on a system for sewerage treatment, and between \$1,000 to \$5,000 is being spent daily for chemicals to treat the waste. Quality control does not come cheaply.

Pulp mills have for years caused a most difficult air and water pollution problem. The situation that I noticed in Missoula over the weekend apparently is no exception but the State Health Department and the University people are helping to contain the problem by encouraging the industry involved to construct waste ponds and to take other necessary measures. At least some progress is being made.

Although many constructive programs in air and water pollution control are underway, other problems need attention too. Our Center's mission and I refer here to the National Center for Urban and

Industrial Health is to assist states with their comprehensive planning and execution of environmental programs. Besides activities already mentioned, we have within the Center the national program responsibilities for Occupational Health, Solid Wastes Control, Water Supply, Shellfish Sanitation, Health Aspects of Water Pollution, Injury Control, The Arctic Health Research Laboratory at Fairbanks, Alaska, the sanitation activities of food, milk, recreation and interstate carriers and urban environmental health planning. As you can see, our concern is for building a better environment through a broad effort of quality improvement in the areas listed. I hope we can be of help to you and I would like to mention some of the specific areas of concern to both of us.

Montana, as we all know, is not a heavily industrialized state when compared to states in the east. But there are many very real occupational health problems. You may be familiar with a survey made several years ago by representatives of the State Board of Health and Public Health Service. Let me mention briefly several of the findings of that survey which concern the working environment.

—In 55 automotive repair shops, during winter conditions with vehicle motors running, 50 percent of the carbon monoxide levels were at or above the recommended limit.

—In 10 out of 23 dry cleaning establishments potential hazards associated with the use and handling of perchlorethylene were found. As you know, this is a hydrocarbon with vapors which have a narcotic effect and can cause liver damage.

—Noise hazards were identified as being above accepted limits in 10 industrial plants including foundries, cement plants, and lumber mills.

—In metal refining and manufacturing, a major industry in this state, excessive exposures to metal fumes and dusts, mists, gases, and harmful vapors were found.

From these examples, it is obvious that even though you may provide a better environment for your citizens by cleaning up air and water pollution and solid wastes, a more thorough job is still needed as long as man is exposed daily to dangers in his work.

To improve conditions in this very important sector of environmental health and safety a significant piece of health legislation has been introduced in this session of Congress—the Occupational Safety and Health Act of 1968.

Under this proposed legislation on which hearings already have been held, the Secretary of Labor is given authority to set and enforce safety and health standards for businesses in interstate commerce and for businesses with Federal contracts exceeding \$2,500. Included in the enforcement area is the authority to issue an administrative cease-and-desist order in the case of imminent danger to the workers involved. The bill also provides for civil and criminal penalties for violation of the standards.

In the area of Federal-State relationships, the bill calls for program grants to the States, up to 90 percent of the cost of their occupational health programs, with the Governor deciding which agency or agencies will receive the funds. Under the present provisions, this program would continue through 1971 when the Secretary of Labor is required to report and make recommendations to the President and Congress. If State laws and their enforcement carry out the objectives of the Act, the States, with the approval of the Secretary of Labor, maintain their jurisdiction in the field of occupational safety and health.

Although the Department of Labor is given the biggest responsibilities under the proposed legislation, the Department of Health, Education and Welfare's role is crucial in the development of effective and realistic criteria and standards. To carry out our end of this partnership, our Department would be given, for the first time in this field, legislative authority for a research program which includes contracts and grants.

Our Department would also have responsibility for training the many additional hundreds of technical, professional and scientific personnel that would be required by industry, by States and communities, as well as the Federal agencies.

As many of you are aware, one of the problems our occupational health program has had is the lack of specific legislative authority as well as inadequate funding. When you consider that this program has operated for over 50 years under the broad but very general provisions of the Public Health Service Act, the proposal of legislative authority for these activities is in itself a major change. Let us hope that this will bring us in as a full partner to help you plan a better environment for those that work for a living.

Another problem that I alluded to briefly at the beginning which I don't think you in the west can

escape is that of over-crowded and badly deteriorated cities. This problem may not be as compelling here now as it presently is in the east and along the Pacific Coast. It nevertheless does exist on a smaller scale—and necessary steps should be taken to prevent its further growth.

Two of your cities, Butte and Helena, have already been designated as Model Cities under the Federally sponsored Model Cities Program. They are currently engaged in various types of planning activities to cope with the social and physical problems of urban blight. They are working in many areas of urban renewal, health, education, welfare, transportation, and so on. Right now they are trying to organize a program of "Health Educator Aides," a concept which originated in Chicago and was put into effect by the Chief of our Central Environmental Sanitation Program. The "Health Educator Aide" is a person from the slum or deteriorating area of a city who desires and is able to educate his fellow urban dwellers in ways to improve the quality of their lives—by better sanitary practices, job training, family planning—the works.

I am sure we recognize that even in western cities such as Helena you are experiencing the beginning stages of urban blight in some parts of town. In order to prevent their further deterioration, there must be developed an awareness on the part of local policy-makers that the expert advice of the health professions can be utilized to a great advantage by city planners, architects, and industry. The health related aspects of environmental problems in a city or town should always be taken into account during any plans for city improvement: such problems as providing for clean streets, proper refuse collection, proper housing standards, adequate recreation areas, as well as others. All components of the environment should be examined to determine both its health and social implications. This means, for example, looking at a projected new sewer line as more than just a means for moving existing waste from one place to another. We must also consider it as a forerunner of housing developments, of traffic patterns, shopping areas, labor markets, industries, pollution, and all the other problems that accompany urbanization.

There is no question but that preventive planning and action *today* will be vastly cheaper and more satisfactory than curative effort tomorrow. If the governments and the peoples of the western states are alert and determined and take as their model the preventive planning approach, your problems at least will not get any worse; with luck and effort they should improve.

One of the most practical tools which you are using as an aid to your health planning is the Federal Comprehensive Health Planning Act, P.L. 749. This legislation which has been in effect for more than a year is designed to help state and local plans work by providing funding assistance for comprehensive health services. For fiscal year 1968 \$62.5 million is authorized for state grants on a formula basis; plus another \$62.5 million for project grants for health service development. Environmental health projects have a rightful claim in some of these funds, along with the more medically oriented programs. The public interest will be served best if both types of programs make use of these funds.

Comprehensive health planning gives us an opportunity to visualize for the entire health field the impact of environmental factors on public health and to demonstrate that these factors deserve serious consideration. The planning activities which are fostered under the Act provide an excellent opportunity to get down to the basics of health protection.

There are some people who think that the problems of our expanding population and environmental contamination are so vast and pervasive that only the Federal government can cope with them.

This is not a very realistic approach. Historically, organized public health programs in this country evolved as a partnership between Federal, state, and local governments. And, in fact, the whole purpose of the new system of grant administration under P.L. 749 and under the proposed Occupational Health legislation is to insure that the States accept greater responsibility for devising and conducting their own health programs. There is considerable autonomy granted under both these pieces of legislation and the States are strongly encouraged to use it.

I would like to mention some of the other programs of my Center in which you have an interest. For the last 2½ years we have been administering the new Solid Waste Act. Funds are available to states for planning grants which will bring about an organized effort on the part of a state to solve its solid waste problem. Such a plan will consider existing legislation and the need for new legislation. It will also recommend cooperative efforts on an area-wide basis and the best methods of collection and disposal. We have some 165 million tons of solid waste to handle each year and I am sure Montana has its proportional share.

Planning in the water field is "old hat" with this state. Your Governor is a member of the Columbia Basin Interagency Committee and the Missouri Basin Interagency Committee. All states in these basins

and the water oriented federal agencies, including the Department of Health, Education and Welfare, are members and jointly plan water use projects.

Regardless of this planning you still have water supply problems but nothing compared to many other states in the U. S. Not all your municipal supplies come up to Public Health Service standards of quality or design and they are not all approved by your state health department. Some supplies need demineralizing. The difficulty with this today is that communities cannot always afford to pay such chemical treatment and there is little in the future that we can see today that offers much hope.

We recognize the shortcomings of some of the technology in the water supply field today. Our Center is dedicated to additional research in this area and, as you will recall, President Johnson called for a serious look at the health aspects of the nation's water supplies in his State of the Union Message. You cannot plan completely the needs of a municipal water supply if you do not know the significance of the trace elements and organics contained therein. It is almost ridiculous to think that by the time you find out that a water supply is biologically unsafe it may already be too late but that is the state of the art today. In this area of research we must be ready to help.

In any discussion on environmental control we must not overlook one of our most serious preventable public health problems—namely, injury control. One hundred thousand people die every year as a result of accidents—about half as a result of vehicles and the rest around the home or in other non-traffic situations. One in four individuals in the United States is injured every year by everything from glass doors to lawn mowers. The Center is now placing a major effort on the epidemiology of accidents which should give us, and you, some valuable tools for planning the control of injuries.

The problem ahead can probably be summarized in a four-point program that can be accomplished only by a partnership of responsible levels of government. The points are as follows:

- (1) Establish quality standards for the environment.
- (2) Establish a mechanism for maintaining an overview of the environment.
- (3) Provide for the means of bringing about corrective action where warranted.
- (4) Clearly identify the lead agency role and responsibility.

The accelerated rate of change of the quality of our environment accentuates a sense of urgency to get on with the job. A report to the Secretary of the Department of Health, Education, and Welfare, with the same title as this conference, "A Strategy for a Livable Environment," expressed the problem this way:

"At the two-thirds point of the 20th century man has discovered he cannot act with the abandon of a caveman. For countless thousands of years man has treated this planet as a dumping ground, boundless in its ability to absorb insults. . . . In short, we cannot engage in biological and chemical warfare against ourselves."

The report I have just quoted was drawn up by a task force by Ron M. Linton, a Washington consultant on environmental and urban affairs. It is regarded as a blueprint for many of our future plans. The report sets forth a number of environmental health goals for the country that we in NCUIH consider mainly our responsibility within the Federal establishment but are basically the state's prerogatives.

Allow me, if you will, to list some of these goals and to tell you a few of the things we think should be done to reach them.

The Linton group, for example, says that by 1970 this country should have health-approved drinking water for 100 percent of the Nation's public systems. As is the case in many of its recommendations, the timetable is actually unrealistic. This is no fault of the task force. Sufficient funds simply are not available. In fact today we do not know the extent of the problem but neither do the states. But the goal regarding water supplies is mandatory. There is probably as much justification to help the states and local communities in this area as there is in water pollution control and if it can not be solved locally then other means should be used. The people of this nation have a right to a safe water supply under adequate surveillance. We may have the best water systems in the world today but there are at least half the people that use water from systems from which adequate data are not available as to their safety.

In the field of solid wastes, the task force believes a grant-in-aid program will be necessary at the local level by 1973. We believe Congress will hold hearings on such a bill within a year. In the meantime we are sponsoring demonstrations of such new disposal techniques as hauling trash out of the city by rail, using heat from burning waste to generate electricity, and transporting waste by pipeline. But

no matter how beneficial these techniques prove to be we should keep in mind the main cost of solid waste control in a city is the cost of collection. We know that local governments will always find this service one that is difficult to finance by themselves. In fact today there are very few communities that maintain existing solid waste handling facilities properly. This problem has been called the "Third Pollution." Let us hope the states and local communities recognize this fact today and accept the challenge.

Another task force goal is the development, by 1973, of basic data to establish human levels of tolerance for congestion, noise and other contaminations of our environment. Here we encounter, among other things, the terribly difficult problems of our riot-torn slums. Forty-seven million people, according to the 1960 census, were living in dilapidated units or in deteriorated units with plumbing deficiencies. Our long range objectives in this field must concentrate on developing criteria and standards for housing hygiene.

A consumer protection effort is called for in another task force goal. Here the task force is talking about the need for health and safety standards associated with the use of appliances, clothing, food, hazardous substances.

Our Center's Injury Control Program, while still concerned with traffic injuries, is becoming increasingly involved in the problem of the 20 million persons injured every year from consumer products. The program already has made considerable progress in persuading manufacturers to make such products as glass and power lawn mowers safer. The program also backed legislation that was enacted last year to bring about the production and use of flame retardant fabrics to reduce clothing and other fabric burns. Our long range plans here involve the use of epidemiologic teams developing criteria and standards for safer products and establishment of public education programs. Similarly, in the area of food protection, we need to expand surveillance activities to identify hazards and to encourage the development of ordinances and codes to prevent foodborne illnesses. We have no real dependable information today on the extent of this problem because of the lack of complete epidemiological data. What about the positive side of the food program? I refer here to nutrition. It is a known fact that food not sold in some super markets because of deteriorating quality finds its way to the ghetto. This is not justified if it results in a health hazard.

The task force was optimistic in setting a goal in the field of Occupational Health. It asked for an occupational disease and safety protection effort to extend, by 1970, preventive services to 100 percent of the employed population at its work place. I have discussed the legislation designed to deal with this effort, but one occupational health problem that deserves special attention is noise.

Noise is becoming an extremely serious pollution problem—some people call it ear pollution—maybe it's the fourth pollution, not only in the work place but in the community. Our Occupational Health Program has conducted some excellent research on noise, but, again there are many unanswered questions.

There are, for example, no enforceable threshold limits now established for noise in the work place. The people in our program are now proposing such limits, with an upper limit of 107 decibels. That is the equivalent of the noise produced by an air hammer, and the recommendation is that such noise should not be tolerated by the human ear for more than one hour a day. There are of course the psychological aspects of noise that are just as important as the physiological aspects mentioned above.

For the most part, I have been discussing what the Federal government hopes to do or is doing about upgrading our environment. The subject here today, however, relates to a strategy for a better living environment in the State of Montana.

Theoretically, the best government unit to do a particular job is the one closest to the problem. In practice, the best unit to do a job is the one which can get the job done. With the help of the Federal government, I believe that the states can fulfill both of these aims. They are the closest to the problems, they have the basic responsibility for environmental health and are organized to do the job. They should plan to get on with it.

In evaluating our plans and our programs, we must ask ourselves some questions for which answers in the affirmative should be forthcoming. Do our plans work? What are they producing? What are they preventing? I would hope that both we at the Federal level and you at the State and local level are working toward the same goal; that of preventing the mountains, deserts, plains, and valleys of this nation from becoming a not very pretty picture of air, water and noise pollution, dotted with piles of litter and waste, with a backdrop of slaughter on the highways, injury and disease in the factory and social unrest in the towns—in total, a generally ravaged nature.

Of course, we must try to help you prevent this from happening.

Considering the nation as a whole, one of the toughest problems we face in controlling the quality of the environment is in the inner city and ghetto area. To a certain extent, even though on a smaller scale, you can relate this to your problems. People create quality problems. The more people you have and the less their interest in the environment, the bigger is the problem. Keep up your interest and you will find the Public Health Service a ready partner with various technical assistance programs, grants, and advice to aid you in any way we can. But of course the real challenge is yours. We must remember there are those willing to do anything for a profit not interested in maintaining a quality environment. Thirty-seven years ago, the Council for the Preservation of Rural England stated the case against them well. In an invocation for a church litany, the Council wrote as follows:

“From all destroyers of natural beauty in this parish and everywhere; from all polluters of earth, air and water; from all makers of visible abominations; from jerry-builders, disfiguring advertisers, road hogs and spreaders of litter; from the villainies of the rapacious and the incompetence of the stupid; from the carelessness of individuals and the somnolence of local authorities; from all foul smells, noises and sights—good Lord, deliver us!”



HONORABLE GEORGE DARROW
Yellowstone County Representative

Montana's Choice: Unique Quality or Common Tragedy

HONORABLE GEORGE DARROW

ABSTRACT

Montana is poised on the threshold of an era of accelerating growth and change. It now seems probable that our population will more than double before the end of the century. Simultaneously, we confront the massive impact of modern technology on our economy, our way of life and our environment.

Increased long-range planning will be required to anticipate the cumulative environmental consequences of these dual forces. New insights provided by the science of ecology can be applied in continuing an orderly development of the state without damaging the quality of our environment.

A unique combination of historical events and geographic circumstances has brought Montana to the last third of the Twentieth Century comparatively unspoiled and unpolluted. Montana is still a clean land and natural beauty is still a part of everyday life.

Other areas of the United States once enjoyed similar environmental assets. Failure to consider the UNINTENDED, UNWANTED and UNFORESEEN consequences of their technological arrogance toward nature has resulted in the common tragedy of an environment blighted beyond repair.

Montana has a fleeting option, before irreversible decisions must be made, to choose to maintain an environmental quality appropriate to the majesty and the elemental affluence of our natural surroundings. Will our vision be big enough to match the dimensions of the "Big Sky Country"?

* * * * *

As we Americans enter the final one-third of the twentieth century, we find ourselves living in an era of almost unbelievable change and growth. Change in human affairs is, of course, nothing new. But the rate of change is. Wherever we turn our attention—whether to changes in the landscape, or to the increase in mobility, or to the availability of knowledge—we find change and growth so rapid that it can only be described as explosive.

The spreading consequences of an unrestrained technology permeate every aspect of our daily lives. And we in turn, through our activities in producing and consuming the resources of nature, have also a greater impact on our environment than any people, in any place, at any time in history.

There is a growing recognition that we Montanans are not isolated from these changes. The geography of open space no longer insulates us from the problems and challenges which afflict other areas of the nation. As we become more deeply involved in the cascade of change sweeping the nation, we realize that much of what has been termed "progress" has in reality eroded the quality of our human habitat. The subtle consequences of environmental tampering are increasingly coming to light. We are beginning to realize that our technology has ecological penalties as well as economic profits. The glitter of a manufactured Utopia is becoming tarnished.

Throughout the country, there has been a rapidly growing public concern with the quality of our environment. Scientists, public officials and private citizens have outlined the problems in some detail in the news media which serve as the national forum for public discussion. Some of us have paid more attention to the threats of environmental erosion than have others. But all Montanans recognize that we cannot tolerate a creeping deterioration of the air, water and land in our state.

It is because Montanans feel deeply about the unique quality of their state that this conference was conceived. A responsive state administration, alert to the escalation of Montana's environmental problems, has chosen this means to define the threats we face and to plan "Montana's Strategy for a Livable Environment." I believe that the importance of this conference is indicated by the joint participation of legislators, officers and administrators of state government and faculty members of the university system, as well as representatives of the public.

To my knowledge, no other conference ever held in this state has evoked such wide-spread interest and cooperation. Each of you, by your presence, have emphasized a common resolve that Montana will remain unspoiled. And each of us can take pride in the leadership that Montana is displaying to her sister states by being the first to initiate a planning effort concerned with the total environment.

We have not taken time from our daily responsibilities to gather here in order to merely deplore our problems or to recite the consequences of our past mistakes and oversights. We are here because we recognize that the preservation of a high quality habitat in Montana can no longer be assured simply

by the absence of quantities of people and the absence of intensity of land use. We are here to plan whatever constructive action is necessary to maintain a livable environment in Montana for this and future generations.

I have been asked to outline a frame of reference which might provide a useful perspective for the papers to follow. To do this, I would like to explore (1) the consequences for Montana of the widespread environmental insults which endanger our generation, and (2) the unique assets which provide Montana with unusual opportunities to maintain a quality environment.

First, what are the consequences of multiplying people and shrinking open space? We have all heard a great deal about the "population explosion," but seldom have we considered it a problem in our sparsely populated state. I would suggest that we take a second look. There are now over 200 million Americans. This nation's population has multiplied 50 times over since the first census in 1790. In combination with the trend toward urbanization this has meant that great metropolitan sprawls of land have experienced not just growth, but saturation—people saturation.

The force of an explosion is spent outward. The metropolitan areas have been confronted with an inward explosion—an implosion—with the impact being that of people upon people. To escape a deteriorating environment in the central cities, these people have migrated to the suburbs. And they have migrated to newer cities, especially in the southwest, that offered a more attractive environment. I might mention Houston, Phoenix and Los Angeles, as examples. These areas in turn have become saturated with people and environmental pollution. Throughout their history the American people have migrated to new areas in preference to maintaining the quality of the urban areas already occupied.

Today, Montana contains perhaps the last great reserve of high quality, unspoiled living space left in the United States. As the problems of this nation's urban areas grow, I predict that the post-war migration to the suburbs will shift to become, within the next decade, a regional dispersion to the few remaining unspoiled open spaces that are left. Montana has been referred to as "The best kept secret in the United States." I believe that within six to eight years we will begin to experience a population growth unequalled since the homestead era in the early decades of this century.

This growth will come, not from an increase in our birth rate, but from migration. Just as the building of the transcontinental railroads through Montana were followed by an influx of people, so will we experience an inflow of people and industry with the advent of jet plane service for Montana cities and the completion of the interstate highway system.

Think back a moment to recall the national image of Arizona before World War II. In that era, the people in the eastern cities thought of Arizona as an uninhabitable desert, populated by jack rabbits, rattlesnakes and a few Apache Indians. No one went to live there unless they were in the last stages of consumption and intended to die in exile. Then, came a 180 degree change in attitude. Arizona suddenly became a glamorous place to be. A quiet resort city called Tucson grew by 150,000 people to double its population in a little more than ten years. Air conditioning certainly played a part, but a change in the national awareness of this region became the prime contributing factor.

I don't believe that Montana's efforts to either accelerate or delay this migration to our state can significantly shape the national image of Montana. With .37 of one percent of the U. S. population, we don't greatly influence a nation of 200 million. But now that the east coast and the Midwest are congested and degraded, now that California and the Pacific Northwest are saturated, now that the Southwest is crowded, what area will feel the impact of the next migration? As soon as Montana is tied into the population centers of the rest of the country by adequate jet service and the interstate highway system, I believe that we will confront the challenge of a population implosion. A highly mobile population and an increasingly mobile industry will begin to converge on this magnificent chunk of America from east, west and south.

I submit that Montana's image in the national consciousness will change as rapidly as did Arizona's. Certainly the impression of Montana as the nation's icebox won't linger much longer in an era of jet transportation and instant communication. The nation's best kept secret will suddenly become known in the congested metropolitan sections of the country. And whatever the proportion of Americans who would choose the southwestern desert for their home, certainly an equal or greater number want to live among mountains, rivers and lakes. Surely they will seek a region unblighted by the massive pollution and accumulated obsolescence left behind by earlier generations.

The image of winter and snow is changing also. To a newer generation that has always enjoyed

central heating, that takes for granted a modern transportation network seldom affected by weather, snow has become not something to dread but something to play in. A boom in winter recreation has made the snow season into a season to be enjoyed.

In making an objective appraisal of the economic and social forces that prevail in the United States, it becomes apparent that Montana is on the threshold of a new era of growth and change. We are going to have growth, but what kind of growth? Without planning, growth may result principally in growing problems. For example, California now has an immigration of approximately 40,000 people each month. What would happen if a mere 1% of these people, together with migrating industry, were to begin coming to Montana in the near future? This would be 600 people each month and 7,200 in a year's time. They will come primarily to the half-dozen largest cities in Montana where urban services and facilities are now available.

Are we ready for this kind of growth? Or are you really convinced that this won't happen? What impact on the quality of the Montana environment can such growth have if we fail to anticipate it? If we consider the unresolved ecological problems we already confront, then it must be apparent that the urgent need for increased planning is already upon us.

It would seem probable that Montana's population will more than double before the end of the century. This will mean that within our lifetime we will need to double everything now in use. All of our housing, offices, schools, transportation facilities, public works and utilities—everything built in the last 100 years must be duplicated in the next 25 to 30 years. For example, the public water and sewer systems of Montana represent an investment of some \$300 million to date. To provide a continuing supply of clean water for a growing population and to handle their sewage will require the investment of another \$300 million within a few more years. As we consider all of the areas of environmental impact that will challenge us in the short term future, the responsibility of this conference becomes clear.

Urban man, in his man-made environment, has forgotten that his affluence is ultimately dependent upon the real wealth of the natural world. The most vital component of that wealth must ultimately be those environmental conditions upon which the health of all living organisms is dependent.

The ecological health of our human habitat is the most basic element of our natural resource wealth. Yet as we view the national picture, there is growing evidence that we are exploiting, altering, converting and contaminating our environment to such a degree that we now stand on the brink of an irreversible disruption of its ecological balance.

Within the last quarter of a century, the hydrogen bomb has become merely one of many equally efficient techniques for destroying human civilization. Man's abuse of his habitat in the past has been limited in extent and ordinarily confined to local sites. The natural resilience of a healthy environment, given enough time, could effect a slow healing of these local injuries. The environmental injuries we are now inflicting are damaging not only to local sites, but to entire natural systems. As Lynn White, Jr., stated it, "The impact of our race upon the environment has so increased in force that it has changed in essence."

Some of our grandfathers came into this region only two generations ago to "tame the wilderness." So successful have been the efforts they began, and so great is the momentum of this generation in its efforts to "subdue a raw land," that we are now poised on the threshold of irreversible tampering with our environment. Our thoughtless individual acts of pollution and habitat alteration may constitute almost imperceptible increments of damage to our environment. These same environmental insults become, as the aggregate acts of 200 million people, become an almost systematic destruction of the basic livability of the American continent.

So unprecedented and so pervasive is the present onslaught against our environment that the conservation concerns of only a generation ago seem like echos of an age of innocence. At that time, prior to World War II, conservationists were able to enjoy the luxury of focusing their attention on a few conspicuous individual problems, notably the squandering of forests and topsoil, and the subduing of floods. Commonly those who caused the problems were also the principal victims of their environmental abuse. Today these problems, yet unresolved, have been displaced by more urgent and often more subtle environmental threats of overriding importance which seemingly endanger the future of life itself. I might illustrate this by citing a recent paper by Dr. LaMont Cole of Cornell University, an ecologist who is concerned about the oxygen system of the planet. There is only so much oxygen in the atmospheric envelope. This oxygen is generated by the photosynthesis of green plants. As we cover more areas with pavement, we have fewer green plants. But most importantly, 70 percent of the oxygen is generated by those small floating plants in the ocean, plankton and especially a species of plankton called diatoms.

You will recall reading about the sinking of the tanker, Torrey Canyon, off the coast of England about a year ago. That was filled with crude oil. What if that tanker had been filled with herbicides?

Doctor Cole believes that dumping of that quantity of herbicides would have been enough to halt the process of photosynthesis in the whole North Sea. What would this do to our planet's oxygen supply?

The collective impact of the UNINTENDED, UNWANTED and UNFORESEEN consequences of our technological arrogance toward nature, compounded by ever-increasing numbers of people, is bringing about an ecological crisis that is without precedent in all the earth's long history. Our society has been too preoccupied with consumption, with its enjoyment of material goods, to note the declining quality of the total environment which has marked each stage of our material advance.

Montana has so far avoided the degree of environmental erosion found in many other areas of the country. Our empty space and our underdeveloped economy are becoming less a liability and more of an asset with each passing year. Slowly and often painfully we have knit together the economic fabric of the state. We now have the physical framework—the infrastructure, if you please—to provide a base for accelerated development.

If we can plan with foresight and choose wisely among the irreversible resource decisions that must be made, this growth can come without damaging the quality of our environment. We need not repeat the mistakes of other areas and other generations. We can use the new insights provided by the science of ecology to anticipate the problem of subtle environmental consequences whose effect may be far removed in time and distance from the cause.

Montana has some important assets to employ in maintaining the unique quality of its environment. Perhaps most important is the fact that we still have a little time left. We do not as yet, confront problems of crisis proportion. Our past development has touched lightly rather than with a heavy hand. Our problems are still manageable. We can still plan with confidence to maintain an existing quality, unlike many areas that can only hope to partially restore an irreversible degraded environment. We are not confronted with the problems of a Lake Erie, which has now become the world's largest cesspool.

As the largest inland state in the nation, Montana is endowed with space in which to absorb an orderly growth. In our unique location at the apex of the continental watershed, Montana is the source of the two mightiest river systems of the country. We are privileged to use water direct from its source in mountain snow fields. We do not have to deal with water polluted by upstream use and carrying the wastes of others beyond our control. We can maintain the quality of our water from its first headwater use until it leaves the state.

Back in 1936 when the American continent was big and our collective impact on it was small, Gertrude Stein wrote, "In the United States there is more space where nobody is than where anybody is. That is what makes America what it is." If this is the essential ingredient of our country, then Montana is about the most American place left in the nation. The national parks and national forests that occupy vast areas of Montana are insurance that unspoiled open areas will continue to be available to future generations.

Included in our heritage are not only these natural endowments, but also the very important asset of the attitude of Montana people now and in the past. Montanans have a concern for their environment that simply doesn't exist in many states. And on repeated occasions they have taken the necessary action to preserve its quality. Montana's Water Pollution Act was passed by the Legislature in 1955, preceding by a full ten years the Federal Water Quality Act of 1965. All of the major streams in Montana were classified by 1960. Today, because of this foresight, Montana's streams still retain a higher water quality than those of any state in the nation. In 1963 the Montana Legislature enacted the country's first Stream Preservation Act. It is still the only such legislation anywhere in the United States. This conference can add to the record. Your children and grandchildren are depending on you for their future.

In closing, I would like to suggest the ecological application of Gresham's Law. In classical economic usage this law states that, "Bad money drives out good." Throughout history, the introduction of debased coins has driven out of circulation coins of higher value. This was illustrated a few years ago in Montana by the disappearance of our silver dollars from circulation.

In an ecological sense, a polluted environment drives out the people and the type of industry that demands quality. You might add a corollary, "Blight attracts blight," and "Quality attracts quality." Montana still has a fleeting option, before we are overwhelmed by unplanned growth and before irreversible damage has occurred to make a choice. Will our inaction allow Montana to become a future Appalachia?—In Daniel Boone's time, Appalachia was described as being a place like Montana. It also had large mineral deposits and bountiful natural resources. Its mountains, forests, streams, wildlife and fish made Appalachia a choice place to live and prosper.—Or will we resolve to maintain an environmental quality appropriate to the majesty and the elemental affluence of our natural surroundings? Will our vision be big enough to match the dimensions of the "Big Sky Country"?



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Recreation and Environment

ROBERT F. COONEY

ABSTRACT

Montana's outdoor recreation is inseparably associated with its surroundings or environment.

Many qualities go into the makeup of this environment. These consist of such things as the condition of the land, water and the air. Here in Montana, although somewhat neglected in the past, recreation and the associated environment are now receiving much interest and important restoration and development programs are being carried out.

Some environmental problems are still found, but less than in most of the rest of the nation. Progress is being made in overcoming those that do exist.

Montana is particularly fortunate in possessing a great variety of outdoor opportunities of unusual interest and quality. Visitors are drawn from all over the nation to share in this particularly enjoyable and healthful environment. Youth benefits in many ways from these outdoor qualities. The natural beauty of the state coupled with its zestful outdoor recreation opportunities may well influence many young people to stay here.

A spectacular variety of topography, plant cover and wildlife species coupled with a healthful four-season climate and excellent history all blend to create a recreational environment that is surely one of the state's greatest assets.

With careful planning, Montana can achieve and maintain a coordinated balance between recreation and the other important uses of its superb outdoor environment.

This represents one of the state's most important concerns. The present conference is without doubt a forward step in this regard.

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It has been said that we are each born with a variety of strengths and weaknesses and how our total environment relates to these, largely determines our ultimate personality. It has further been suggested that what we hear, see, smell and even feel combines in a subtle, but unescapable manner, in helping to shape our lives.

The air around us, the soil and water that covers the surface of the earth, natural beauty, as well as the evidence of man's activities, are all a part of it.

And opportunities to enjoy a zestful, attractive out-of-doors are perhaps the most important of all.

Outdoor recreation is without question inseparably associated with the environment. We would, I feel, also agree that ours is a state richly endowed with such environment. Perhaps in a way this very outdoor affluence led to problems for Montana in the past. Lulled by ready availability, we had tended to take it all pretty much for granted.

In fact, in looking back it is evident that recreation and its associated environment was inadvertently, but surely neglected. Opportunities to camp, hike, fish, or swim were so casually available that little was done to perpetuate them, much less consider the surroundings which made them so enjoyable. This feeling of complacency ended, however, quite abruptly with the termination of World War II some twenty years ago. Returning young people had a chance to judge the changes that had been taking place, more rapidly than most at home had realized. Access to many pleasantly remembered outdoor opportunities were no longer available. Quite frequently the quality of those places that were still available were being definitely downgraded.

So here we were, not so long ago, face to face with problems and responsibilities that were largely new to us. Even in our "Big Sky Country" we were being confronted by instances of air pollution, and in one of the last strongholds of clean, clear streams and rivers, water pollution was becoming evident. More subtle environmental changes affecting recreation opportunities were also taking place.

With this for an introduction, I would like to explore for a few moments, what we have left in the way of healthful, enjoyable environment. I hope, with the contention that Montana is still endowed with these assets, I do not create a feeling of complacency or a lack of concern. This would be a tragic mistake.

Our state still has superlative outdoor recreational opportunities. Variety and quality are hallmarks of these characteristics. We have, for instance, only to glance out the window here today to catch a glimpse of our mountains. We are less than an hour's drive from the very headwaters of two of the nation's great river systems. Lakes with boating, swimming and excellent fishing opportunities are nearby. Pleasant, attractive countryside is all around us. And this is only a small sample of what we have to enjoy throughout the state.

Even with this optimistic viewpoint, however, we must admit that some of the original charm has been lost or is being changed materially. Dredging the bottoms of small valleys and mountain canyons, mostly years ago, left eyesores that are slow in healing. Unattractive logging scars have lessened the scenic value of several otherwise unusually beautiful areas. Unpleasant odors are here and there apparent. Water pollution problems are still somewhat troublesome.

These are perhaps the most obvious of the changes that have taken place in our highly valued outdoor environment. But we can also find instances of unsightly litter, erosion, cluttered roadside signs, poorly located junkyards, as well as the hodge-podge that is too frequently characteristic of our community and city edges. We have them all. My point is that we have less than most, and a great deal more of unspoiled environment.

We are in most instances aware of these problems. They stand out because they are exceptions. It is encouraging that we have been willing to face up to and do something about them. This indicates a very sincere concern in not wishing to allow our state to sink to a level of scenic or healthful mediocrity. Using the vernacular, "We still have a lot going for us."

It is interesting that recreation has been briefly but clearly defined as "The use of outdoor environment for enjoyment and well-being." Here again is brought out the essential association between recreation and its surroundings. Another aspect of this definition that merits particular consideration here is the reference to well-being and health. In these days of stress, with masses of people existing in almost unbelievable concentrations, our good fortune in having adequate living space is becoming increasingly evident.

As we glance across the nation, it is interesting to see that people tend to move from city centers to suburbs in a continuing effort to get close to nature, and yet they frequently find the out-of-doors moving farther on. This frustrating search must in many cases represent a true ordeal. Here in Montana we have only to observe the continuous increase in our out-of-state visitations to be impressed by another evidence of this urge to sample, where still available, a pleasant, relatively untrammelled environment.

We have nearly five times more visitors to our state than we have residents. In further strengthening the thought expressed above, without question many come to enjoy, with us, our outdoor recreational opportunities. They are drawn here for the most part by the very elements of the environment which we enjoy but perhaps have not always fully appreciated. This again points up an added value to the maintenance and enhancement of these natural assets. Just how we choose to manage them will have an important impact upon our way of life as well as that of our many visitors, not only now, but during generations to come.

As a partial answer to this I am reminded of a phrase which I heard some time ago. It brought out that Americans are fundamentally an outdoor people. When they look for the meaning of their past, they are not apt to seek it in ancient ruins, but more likely in mountains and forests, by a river, or at the edge of the sea. It further indicated that we cannot stray too far from the out-of-doors without losing character, strength and orientation.

In the enjoyment of these assets, it is becoming increasingly evident that young people engage in more kinds of outdoor activities than do most of their parents. Perhaps one of the greatest returns, therefore, of our out-of-door opportunities, is the development of healthful, self-reliant youth more able to deal with the many and increasing challenges of day to day living. In this regard, it is also of much interest that the young people of Montana saw fit recently to hold the first statewide youth conference on conservation and natural beauty. This surely evidenced their deep concern. The very fact that ours is an especially pleasant state in which to live may also be an important factor in influencing many of these outstanding young people to stay here.

As we all know, ours is becoming a continuously younger society. The average age of our Montana population is definitely moving down with the national trend. It is obvious that in concern for

our future environment we should be thinking more and more of the needs, the hopes, and the plans of our young people. Its full custodianship will be in their hands in a very few years.

In the broad scope of total environment, it is evident that we should consider not only the land, but also the water, and the air. In protecting and perpetuating this natural heritage we should make decisions with a true feeling for quality and balance. In this regard we will be considering the past as well as the present and the future. We will also be considering economic development as well as beauty, the works of man as well as the works of nature, and finally, the urban with the rural. Each of us is bound to assess these things somewhat differently, but how our mutual concerns match up with this concept may well have an important bearing on the future environment of our state.

At this point I would like to venture a general observation on Montana's potential in regard to outdoor recreation and how it relates to our most uncommon total environment. Perhaps as suggested in the beginning, some of these things have been so close to us, all of our lives, that we need an occasional reminder of their values.

Let's think, therefore, for a moment of our spacious prairies and agricultural lands, lovely river valleys, badlands, foothills, wooded mountain ranges and remote, ageless wilderness. These coupled with an abundance of lakes, streams, and rivers, present opportunities for a host of outdoor activities. A distinct, zestful, four-season climate and an outstanding variety and abundance of fish and wildlife add to this vast potential. Also, tangible evidence of the state's especially colorful and exciting past, indeed enhances the flavor and quality of our outdoor recreation.

And finally, I am convinced that we in Montana can achieve a well planned, coordinated balance between agriculture, mining, lumbering, industrial development, utilities and recreation. It would seem to me that only in this way we can assure the perpetuation and full enjoyment of our beautiful and healthful out-of-doors. It will not come about, however, unless WE MAKE IT HAPPEN. This could well be our most urgent challenge. In carrying out this objective, the leadership here today can certainly play a most vital role. If a state ever had a chance to retain a superb environment and outstanding recreation opportunities, it is Montana, and now.



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Recreation in the Environment

RICHARD KONIZESKI, Ph.D.

ABSTRACT

Montana is abundantly supplied with natural resources. The most valuable of these is its environment, epitomized in the title "Land of the Big Sky," recreational paradise. However, we are despoiling our environment systematically and at an ever increasing rate concurrently with industrial exploitation of our other resources. It is difficult to describe the amount or degree of degradation because of the imprecise parameters involved. However, the environmental-recreational combine contributes both economic and humanistic returns and is therefore doubly important in terms of ultimate social welfare. It is our responsibility to save what we can of this resource. If we don't act quickly and with decision, it will soon be too late.

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I have been asked to discuss "recreation in the environment"—as it pertains to Montana. This is a most complex topic and a difficult one to present because of the many interrelationships and imprecise parameters involved. For example: what is recreation? Obviously it is many things to many people. One man's joy may well be the next man's sorrow. Furthermore, we have two principal groups of potential recreationists to consider, in-staters and out-of-staters. What does each group want and if there is a conflict, which group should be discriminated for, or against? Also we have here a great variety of environments. How can they best be utilized in terms of their recreational potential? Is such use justified, or even desirable? Will there be adverse effects due to over-use, and if so, can they be modified through wise planning?

And speaking of adverse effects: as you know, our environments here in Montana have been and are being systematically despoiled concurrently with industrial exploitation of our natural resources. Is such depredation desirable, or even permissible in terms of ultimate social values? If not, how can such an untenable situation be rectified? How can it even be described with any degree of precision because who can apply meaningful figures to the humanistic values of a sunset in an unspoiled pristine environment or to the furtive glow of that same sunset reflected through a smoggy haze across a dammed stagnant reservoir against a backdrop of logging roads, clear cuts and mine dumps?

Montana is a unique state, largess with its natural resources, its beauty. To its original inhabitants (the Blackfeet, Flathead, the Crow Indians) it was a mystic "Land of the Shining Mountains." To the early settlers, however, it was the "Bonanza State," rich in furs, minerals, timber and land—theirs for the taking. Unfortunately, it is only recently, within the past half dozen years or so, that Montanans are at last becoming FULLY aware of the multiple values of our state's GREATEST natural resource, epitomized in the title "Land of the Big Sky" environmental and recreational paradise. Only recently and, in terms of reaping the full potential benefits of that resource, perhaps too late.

When the early settlers came west, they came to wrest their fortunes from a hostile wilderness that, like Kate in "The Taming of the Shrew," had to be subdued before it could be enjoyed. And they ravished the land with a fierce determination. They slashed, cut and burned thousands of square miles of virgin forests. They ripped up the prairie sod in often times ill advised attempts to farm land that had better been left in its natural state. They dug and blasted into the very bowels of the earth for the minerals contained therein, and in their frenzied haste destroyed thousands of acres of fertile farmland of far greater and more lasting value than the mineral wealth they gained. They flooded hundreds of square miles of fertile bottomland in multiple purpose schemes of questionable ultimate benefit. They mutilated the mountainsides with tens of thousands of miles of logging roads as they gutted the landscape with hundreds of thousands of acres of clear cuts. They built innumerable factories and polluted the once beautiful free-flowing streams of yesterday, the water we drink, the air we breathe, and even the food we give our children. Yes they, and to our immortal shame we of the present generation in our grasping stupidity, have ravished the land until in a final act of desperation the people are reduced to begging for federal intervention in order to save what little remains of Montana's irreplaceable environmental heritage—from our own wanton actions. All justified in the name of progress—PROGRESS?

What is this thing—progress? Is it increased population, larger cities, more and more people crowded into less and less space as so many of our businessmen and Chambers of Commerce would have us believe? I think not! Or could it be increased per capita income, more TV's, bigger and faster autos capable of spewing out ever greater and gustier amounts of exhaust across the state, more and more

power boats dashing up and down spreading fumes and oil slicks across the once quiet, pristine waters of our violated mountain lakes? I think not! Or is it simply increased leisure time coupled perhaps with growing waistlines from eating and drinking not wisely but too well? Is it all of this—and only this? I think not! I hope not! What are we profited if, while increasing the level of material goods and services per capita, adding to our materialistic opulence and increasing our leisure time, we concurrently corrupt our environment to the ultimate depths of irreparable degradation?

Ladies and gentlemen, Montana is today, still a fabulously endowed state, not through any efforts of ours who have done little but despoil and degrade, but by nature, the very God who made us all. Montana is uniquely endowed to provide BOTH a prosperous livelihood AND an unexcelled environment for her people while at the same time serving as the recreational mecca of the nation. It but remains for us to recognize this fact—and once recognizing it to plan wisely for retention and enhancement of such environmental and recreational attributes as we have not already corrupted beyond all possibility of rehabilitation.

In Montana, outdoor recreation is mostly water-oriented recreation, and as such, its appeal, its quality, its desirability is directly related to the pristine qualities of our rivers and lakes, as well as the surrounding environment. For example, aside from actual water-contact sports such as swimming, fishing, water skiing, etc., the most desirable public campgrounds are generally located near water, most wilderness trails and many of our highways follow along watercourses, and water oftentimes provides an aesthetic background to what would otherwise be no more than prosaic settings. Unfortunately, up to now, water-oriented recreation has been in a position similar to that of the gentlemen who ordered hash—it has received only the leftovers. After the Corps of Engineers and the Bureau of Reclamation have dammed our rivers, the power companies have run them through their turbines, agriculturists have diverted much of their flow for irrigation, and industry and municipalities have done their best to pollute what's left, we, the citizens of Montana, are welcome to enjoy the residue.

However, quality water-oriented recreation such as is especially desirable to us, and is moreover, especially attractive to potential tourists across the nation, quality water-oriented recreation is almost invariably linked to naturally occurring bodies of undammed, undiverted, uncontrolled, unpolluted water. Most of the other states already have their own unsavory, fluctuating dammed reservoirs. They look to Montana for Blue Ribbon fishing streams, wild free-flowing rivers, whitewater float trips, clear pristine lakes set in great areas of the "forest primeval," rugged unscarred mountainscapes, wide untrammelled prairies, plus the native wildlife attendant to all of these environments—attractive cities, towns, public campgrounds, manifold tourist facilities, and a happy, prosperous citizenry to welcome them. What they look for, in short, is exactly the kind of environment most desirable for Montanans but which, alas, is being sacrificed bit by bit by each of us to assuage our own unbridled selfishness.

In the early days of exploration, settlement, and community development, rugged individualism, the individual's selfish interests were the public's interests. But we are no longer fighting for survival against a hostile environment. We are masters of our environment. Due to our rapidly advancing technology it is no longer necessary to corrupt our environment in order to maintain or increase output of tangible goods and services. The time has come when each of us must recognize and very carefully weigh the totality of the enduring materialistic and humanistic values of our recreational attributes to society as a whole—as against such transient materialistic benefits as might temporarily accrue to the individual through piecemeal despoilment of our environment. Unfortunately, many of us are still individualists enough, and still selfish enough so that we accept the above dictum right down the line—until it affects our own greedy little spheres of private interest. And there we stop.

Gentlemen, we are the planners, the designers, the developers, the guardians of Montana's future. And each of us is a member of a community, even as that community is a member of a still larger community until finally we are all members of the state and national communities. But still, and at the same time, each of us is an individual with individual problems, individual responsibilities, individual goals. And it is oftentimes difficult to reconcile our own commercial and political goals with the best interests of society. Still, ours is the responsibility, not only to our own generation but equally so to the next and the next and the next generations. The average age, gentlemen, of those of us in this audience, is 53 years. Given a retirement age of 60, which is three years longer than the minimum federal retirement age, that leaves us with seven years, to accomplish—what?

The greatest contributors to Montana's economy are agriculture and industry. Unfortunately, however, they and certain self-serving federal agencies, are also the greatest assassins of a desirable environment, of our recreational attributes. It is common knowledge that agriculture is not only the largest

consumer of water in the state but that it also produces the lowest economic return per volume of water consumed of ANY state in the nation, about a tenth of that derived from recreation. Furthermore, as indicated by Mr. Brinck in an address to the 43rd annual session of the American Water Works Association here in Helena on the 30th of May last, agriculture is also the largest single contributor to water pollution. Industry, or rather certain types of industry, are not far behind, and THEY include air and land pollution along with water pollution. On the other hand as illustrated by a recent Bonneville Power Administration study on the Columbia River Basin (including western Montana), recreation not only ENHANCES the environment but the already significant economic benefits accruent to recreation must continually increase concurrently with increasing leisure time and decreasing quality of recreation throughout the rest of the nation.

It would seem, therefore, that it is our collective responsibility to devise such agricultural and industrial practices and controls (while perhaps necessarily ignoring, at times, certain areas of our own personal interests) such practices and controls as will result in the immediate cessation of environmental degradation, and will provide for the ultimate rehabilitation and conservation of Montana's recreational attributes. Furthermore, it is not enough to initiate studies and pursue endless rounds of discussions while our environmental and recreational heritage is being systematically assaulted. We have many choices but if we fail to act efficiently and effectively now, there will soon be nothing left to conserve. We will have gone from environmental "riches to rags," in a very few generations. Indeed, we are well on our way!

Fortunately, largely through the dedicated efforts of many of you in this audience, we now have water quality controls, and very likely will soon have air pollution controls. Unfortunately however, we still have no sure means to protect ourselves from overzealous federal CONSTRUCTION agencies who invariably "know best" what is good for us in terms of sacrificing OUR environment to provide job security for THEM. To ask such self-serving agencies, who stand to benefit from millions of dollars of federal spending, to do feasibility studies is roughly akin to turning a fox loose in the chicken house with instructions to evaluate an anti-predator program. Any immediate gain from construction of unsound and unnecessary public works is vastly over-balanced by the waste of natural resources and the erosion of our social values. It is common knowledge that the answer to water conservation in Montana lies with small predominantly state and privately sponsored reservoirs, and watershed management programs, and not with the gargantuan, pork barrel monstrosities sponsored by the Bureau of Reclamation and the Corps of Engineers.

But even now there are powerful forces, both federal and private, who advocate the damming of our finest Blue Ribbon rivers, the flooding of large sections of our national parks. Furthermore, there are those who are actively lobbying to win the right to log and mine not only our primitive and wilderness areas but even our national parks such as Glacier and Yellowstone. There are those to whom the sight of an unspoiled natural mountainscape is a direct affront to the senses. There are those in short, who would sacrifice any and all of our environmental and recreational resources for a fast buck, the almighty dollar.

Because our loyalties are often thus divided between selfish interests—and the public's interest, we have no reliable means of protection from the calculated assault of self-serving private organizations and federal agencies. If we are going to keep what we still have in the way of our irreplaceable environmental and recreational assets, and the right to utilize them as we desire, our conservation efforts must come from the people—from us. Each of us, and particularly those of us in this audience, must do his share.

Ladies and gentlemen, our sons, brothers, husbands, are fighting and dying in the jungles of Vietnam, and in their letters home do they ask about the dividends from Montana Power preferred stock, or the market quotations on wheat, oil or copper? No—they dream of the clear alpine lakes; that big trout caught in the Madison, the Gallatin, the Big Hole; the elk hunt in the Bob Marshals. These are the true values, the meaningful, lasting values that Montana offers them. Can we do less than preserve their environmental and recreational heritage—for them—for their children—and for their children's children? I think not!



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Life's Prerequisite — Air

RICHARD A. SOLBERG, Ph.D.

ABSTRACT

It is almost a cliché that man is producing wastes faster than they can be recycled into acceptable forms by either nature or man himself. Our atmosphere is a prime receptacle for much of this waste. But this atmosphere is not limitless as is space, and due to gravity our wastes remain with us. Thus man is inclined to try to place "10 pounds of potatoes in a 5 pound bag" and he further assumes that the bag is bottomless.

Our air is our most critical and immediate resource. Plants and animals can survive far longer without water than air (oxygen to be precise). Air is also our most nebulous resource. Whose is it? We cannot regulate this resource to any significant degree. How can we regulate its use? Who should do this? Air-use is not merely a local concern, as evidenced by world-wide radioactive fallout. The designated "localization" of an air pollution problem is merely a convenience and is definable only in terms of relative opinions.

It is illogical to consider the ways in which POLLUTED air can be made ACCEPTABLE to man. Man is but one organism of millions, yet only man willfully pollutes his atmosphere. Rather man's responsibility to life itself is to consider ways in which CLEAN air can be made AVAILABLE. In this context, one that has been ignored until recent years, health hazards (and economic disasters due to curative measures) can be averted by preventive actions. Economic feasibility assays must include prerequisites for pollution abatement. Indeed pollution abatement processes can provide a positive economic return, in terms of development, equipment, personnel, and recovered wastes.

Wastes are merely atoms and molecules that are arranged in harmful or undesirable ways. We must find ways to prevent undesirable arrangements, or to rearrange them so as to make them harmless, useful, and desirable.

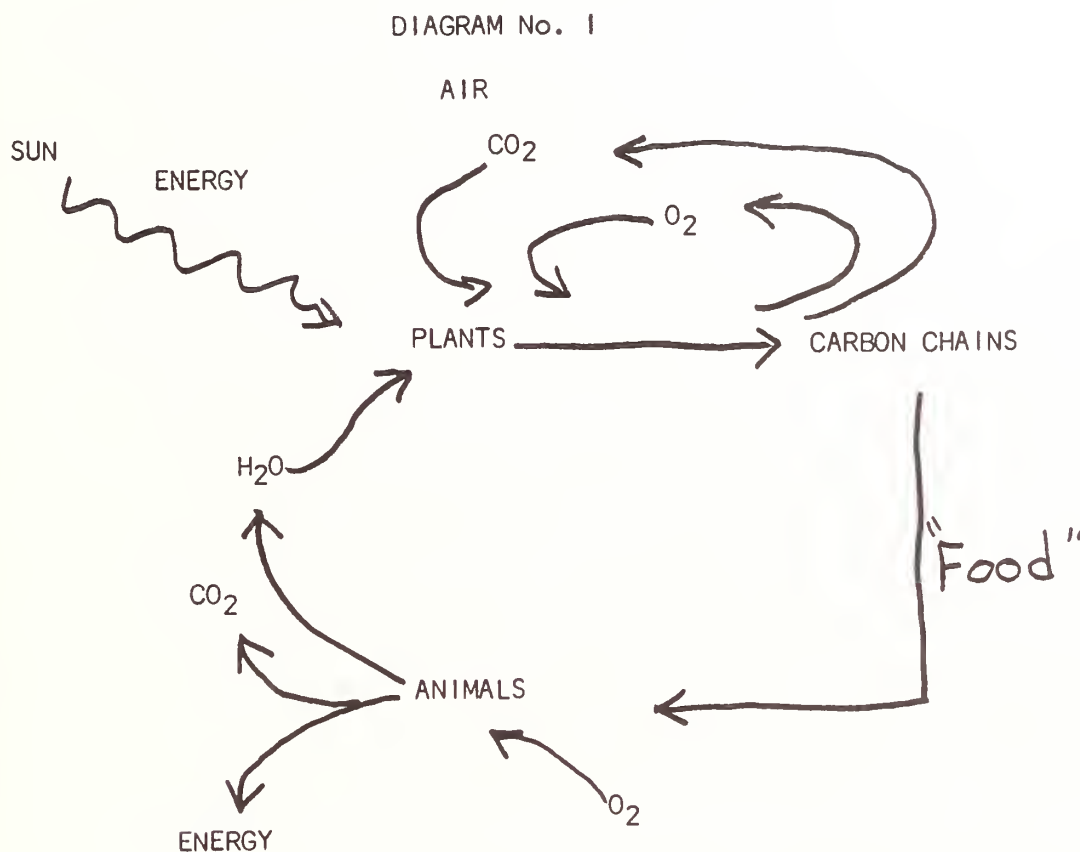
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When man considers the environment in which he lives, he usually reflects on those things that he can detect with his senses. The thin layer of soil which supports his food supply, the water that appears as clouds or lakes and streams in Montana, the organisms that form a community of neighbors. Rarely does he reflect on the air itself, unless it is in terms of wind, a fresh smell due to lack of disagreeable odors, or a clear view.

But let's look at this finite resource in more depth. The troposphere is the lower layer of the atmosphere. It contains the gases in which we live. It is about 7 miles thick. Its dry weight is comparable to having 24 feet of water over the entire globe. For a visual comparison, the troposphere is about 1/1000 the thickness of the diameter of the earth. Thus it is comparable to a 3" diameter orange having a skin .003 inches thick. To further magnify the thinness of this layer, the really effective part of our troposphere is more like 18,000 feet thick. The skin on the orange is then further thinned by a factor of 2 or 3.

As far as organisms are concerned, the two most immediately important gases in the troposphere are oxygen and carbon dioxide. Oxygen makes up about 20% of our air and carbon dioxide, 0.03%. The effective "skin" becomes thinner and thinner as we define terms. Organisms are very passive in terms of

their abilities to regulate the use of their air environment. It is true that animals such as man can "hold their breath" for a time, and plant leaves can partially close their pores. For the most part, however, organisms constantly take in gases from the air, and expel others. This general diagram (#1) illustrates this process:



In any process whereby work is accomplished, energy is a prerequisite. Without energy nothing could be "done." In biological terms, energy is captured by plants in the process of building complex molecules. The building blocks are atmospheric carbon dioxide molecules. Animal life then "burns" these complex molecules to release this captured energy—thereby allowing work to be done. Atmospheric oxygen is the key substance that allows this process to take place.

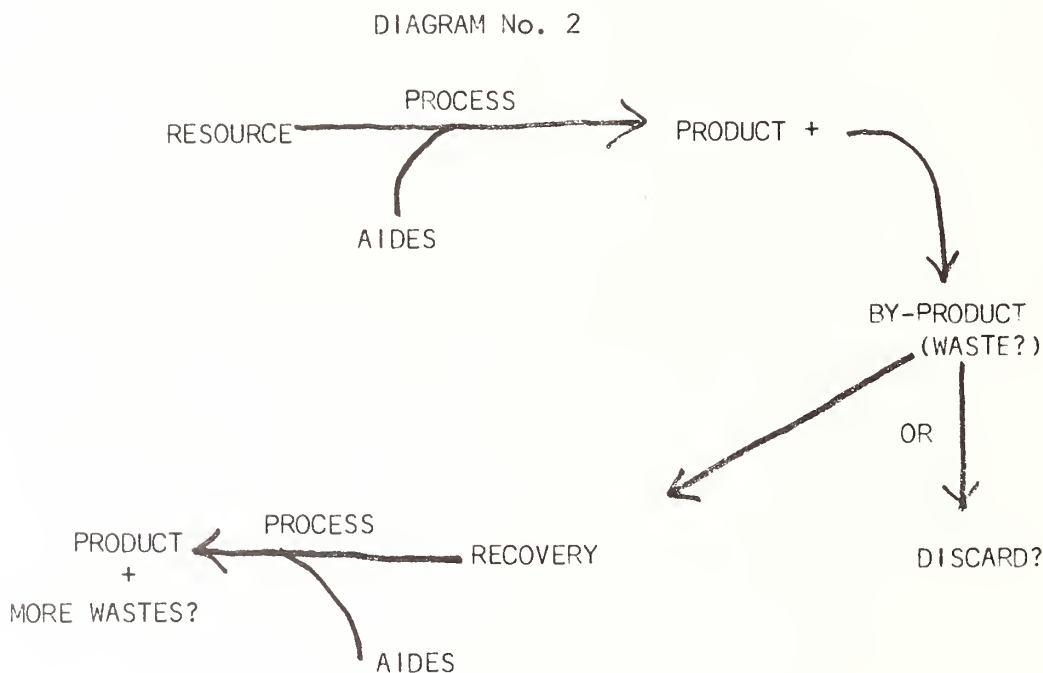
Now how does this all relate to the subject at hand? I've said (and will say) nothing about vistas viewed through clear air and odorless breezes. These are in the realm of subjective judgment. I am concerned about the basic biological requirements of organisms today. I am also not considering practical solutions to local problems, like having individuals leave a polluted valley, closing a factory, or requiring abatement procedures. What I am trying to clearly point out is a basic fact or two, which must be considered as inevitable. That is to say:

- (a) organisms live BY the air environment in which they are found. An excellent example in the biological sense is the air pollutants that are derived from photochemical processes which provide us with a critical paradox! Our biological energy originates with the sun. We cannot continue creating an environment in which the life-giving sun is an agent of death.
- (b) air is not a local phenomenon, but rather a world encompassing fluid.

Another aspect of basic consideration is a definition of waste. Waste to one person is valuable to another in many instances. Again we are faced with relative values. "It smells like money to me," is frequently uttered by stockyard workers, and understandably so. But to pin-point this discussion, let's look at a given process wherein an objectionable gas is placed into the atmosphere. Conceptually, the process is simple. A given type of substance has been changed, usually chemically. During the process the mole-

cules and atoms of one or more substances have merely been rearranged. In some processes the newly rearranged molecules are objectionable. Being objectionable the most expedient thing to do is "throw them away"—liquids into rivers, unsuspendable solids into dump yards, gases into the air.

If it becomes economically feasible, waste gases can be trapped, the molecules rearranged once again, and possibly an unobjectionable product will result. Of course, an unobjectionable product may even be valuable. (See diagram #2.) This then is a problem for science and technology. But I must reiterate that this concept must be a prerequisite to any program of resource development which might involve air as part of the process.



Now let me expand for a moment on the implications of this concept in biological terms. As I have mentioned, air is mandatory for the life processes. (In some cases, such as aquatic organisms, a water medium provides the required gases.) Whatever is in the air comes in contact with gas absorbing cells of all terrestrial plants and animals. The organisms cannot actively select the molecules from the air in this cell-gas contact procedure. Organisms are therefore passive recipients of gases from their air environment. Man is the only organism capable of altering the constitution of his air environment. But is it "his" to change? Can we justify the killing of vegetation and animals from an economic standpoint? Indeed we do so in agricultural practices. But we have a different sort of problem. When pollutants from man's activities destroy other organisms, then man is making certain value judgments that are justifiable only from an economic viewpoint. I prefer to include a biologically based judgment as a basis from which an economic viewpoint should be evaluated.

In regard to this concept, scientists have been prime offenders in air pollution problems. They have not looked into waste production adequately. They have not provided businessmen with adequate, pertinent, readable, understandable information on pollution, the effects of pollution, and pollution abatement economics. They have been prone to chastise ignorant businessmen and politicians (in the best sense of the word "ignorant"), yet they have provided little insight into how the environment functions. They have not explained adequately that the environment is a closed system. In its totality the world must live within itself, so to speak.

We can no longer operate on an Old West exploitation basis. Foresters and cattlemen long ago realized that only so many trees, or so many cattle can be grown in a given area in a given amount of time. Water resource experts and farmers as well realize that water supplies are the limiting resource factors in many areas.

Our air resource is finite. As populations increase, the demand on this finite resource will increase. As standards of living increase, a parallel increase of biological energy will be demanded. The interdependency of biological energy and atmospheric gases is all too critical.

We are, therefore, faced with a world-wide problem which goes far beyond the problems of dead pine trees in Garrison or dead sheep in Utah. We are faced with a world population apathetic about air pollution. Apathy forestalls intelligent resource management. Forestalling management of any resource leads to economic disasters, health and welfare problems, and economically prohibitive curative measures.

Let's look at a few figures to help us realize the magnitude of the existing problem:

- (a) The Air Quality Act of 1967 involves federal expenditures of \$428 million to combat air pollution.
- (b) Deaths of 168 persons in November, 1967, in New York City have been attributed to air pollution, according to Doctor Greenburg, of the Albert Einstein College of Medicine.
- (c) The U.S.D.A. states that there is damage worth \$500 million a year to agriculture due to air pollutants. Most of these are produced in urban areas, but are effective in rural regions. This provides further evidence of the "nonlocal" aspect of air pollution.

Evidence of the world-wide problem is indicated by the research works of scientists at the University of Brussels. They have had to use the Antarctic as a source of uncontaminated snow.

Due to excessive combustion not being counterbalanced by vegetational carbon fixation, it is estimated that by the year 2,000 our atmosphere will contain 50% more CO_2 than at present. The new total seems insignificant. However, the temperature regulating effect of CO_2 is tremendous. Conceivably then, our world will be warmer. This sounds enticing at first glance, but from a biological equilibrium standpoint it could spell disaster. As we realize, the ideal endpoint of complete combustion is $\text{CO}_2 + \text{water}$. Thus it is predictable that if CO_2 production increases at present rates, we will encounter a WATER problem resulting from enough glacial melting to even inundate some coastal cities—like smoggy Los Angeles.

Indeed it is also ironic that the General Motors Company must purify their incoming air with a five-stage filter system so that they can accurately recreate experimentally valid levels of pollution for their studies on abatement procedures.

Our society is now advanced enough to predict resource problems, especially when documented by small, local experiments. We also have the technology to prevent problems from occurring. "The art of pollution-control is not so much primitive in technical means as deficient in social ones." (Seymour Tilson, Associate Editor of *Science and Technology*.)

Such is our air problem. But ultimately, the public, man himself, must define how he wants to live. With an exhausted resource and high living? With a managed resource and healthy respectable living? With depressed resource utilization and low standards of living?

Mr. Mackenzie of the PHS is quick to point out a major problem in the social acceptance of air pollution levels. To paraphrase his statements, we cannot assume that there is a safe exposure level to pollutants. Chronic, long-term exposures to a low concentration of a pollutant may well be more harmful than the short-term exposure to a high concentration.

A balance must be attained. But the balance must be based on certain fundamental facts such as biological chemical requirements, physical and chemical laws and so on. Only then can we worry about clear vistas, odor qualities, and other such luxurious matters.



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Air — for Life and for Living

Some Problems in its Conservation

R. LEWIS BROWN, JR.

In these times no fundamental proposition is more widely accepted as truth than that the ocean of air which surrounds us must now, and in the future, be carefully conserved—not only for our own survival but also for that of succeeding generations.

When there is such complete agreement with this concept, why then is there the discord and delay in its implementation which is so often deplored?

A brief recount of statistics will reveal the enormity of the problems involved in the attainment of clean air. This coupled with a review of interrelated environmental, social and economic problems may provide an insight into the roots of disagreement concerning the immediate methods and standards for the achievement of air quality goals. And when all these matters are considered, an appreciation of our inability to reverse in weeks, months or years the cumulative effects of centuries of ever increasing pollution must follow.

An illustration of the size of the task to restore air quality consider these facts:

1. The total pollution discharged to the atmosphere in the continental United States alone is some 130,000,000 tons per year.

2. According to many studies, transportation accounts for 60% of urban pollution; industry is responsible for 20% of that total; and the remaining 20% is ascribed to domestic and miscellaneous sources such as garbage dumps.

3. We have 90,000,000 vehicles in the United States which will burn about 60,000,000 gallons of gas in a year. This means that each automobile in this country will discharge in a single year over 1,600 pounds of carbon monoxide, 230 pounds of hydrocarbons and 77 pounds of oxides of nitrogen.

4. The Department of Health, Education and Welfare has estimated that air pollution alone costs every person in the United States \$65.00 annually.

5. Under the Clean Air Act of 1967 the government will spend over \$400,000,000 over a period of 3 years to combat air pollution.

6. Industry will spend this year approximately a half billion dollars in air pollution control and expects to spend significantly greater amounts for such purpose in the future.

It is evident, then, that to reverse the trend of increasing pollution, erase the cumulation of centuries of pollution and negative the effect of a mushrooming population with its enlarging effluent ratio per person is a chore of the most awesome proportions. To accomplish our goals in this area will require close and realistic cooperation among governments, business and the public.

Adding to this impressive burden are public attitudes as affected by convenience, interest or economics. For example, approximately 60% of all air pollution in great urban areas could be eliminated by the banning of automobiles and other transport devices employing the internal combustion engine. The devastating effect such action would have on the mobility of our people aside from its paralyzing impact on our economy needs only to be mentioned to demonstrate the impossibility of such a course despite its desirable end.

Fortunately, emission control devices for automobiles presently being manufactured and installed by the auto companies on all new units manufactured and sold in this country give promise of being so effective that when further refined, by the year 2000—allowing for the population and vehicle count increase—the average level of automotive emissions will be substantially lower than it was in 1950.

I say “fortunately” because in a recent national survey of attitudes 85% of the people polled answered affirmatively in response to the following question, and the question was heavily weighted against the automobile: (I will read the question to you and you might ponder how you would answer a similar question):

“The automobile pollutes the air and creates traffic congestion. Highway development demolishes homes and often destroys previously attractive landscapes. The increasing number of

automobiles, together with the inadequate highways, kills over 50,000 people every year. In your opinion, is the contribution the automobile makes to our way of life worth this?"

Of the people polled, 85% said, "Yes."

Other factors which impede the advance in the war against air pollution stem from the interrelationship of all phases of environmental control. Water pollution, noise, congestion, radiation and solid waste disposal problems are threats to our environmental security which require equal attention as does the spectre of air pollution. In attacking these other hazards an air pollution problem may often be created. Conversely, efforts to reduce air pollution may result in other environmental difficulties.

Examples of this environmental interplay are seen when, in order to reduce discharge of contaminants into the atmosphere, municipalities are ordered to cease burning garbage. In Montana we have ample areas for landfill dumps. We have just recently commenced handling our garbage problem that way in Butte, Montana. This at this time does not create any particular problem, but in more heavily populated urban areas, where land is at a premium, the problem of solid waste disposal becomes more acute.

When we consider that this year's rubbish alone would fill 36 lines of railroad box cars extending from coast to coast the portent of this growing problem of solid waste disposal is frightening. It also foretells serious trouble for Montana since, inevitably, the problems of our more populous neighbors today are ours tomorrow.

Another situation which touches Montana is that associated with reduction of a most serious threat to our environment and that is water pollution. In last Thursday's issue of the Wall Street Journal there appeared an article which I read with some amusement and some concern—an article concerned with the unwanted by-products of a desirable action. It seems that the city of Kalamazoo, Michigan, to eliminate wastes from homes, buildings and industrial plants that were polluting the Kalamazoo River and, as it was charged, converting that river to an open sewer, built a nearly \$4 million sewage treatment plant to handle these wastes. This was a very desirable action and very much approved. The unanticipated result of this action was that the city of Eastwood, Michigan, because of prevailing wind direction, receives almost constantly the full effect of the putrid odor given off by the plant. In the words of the Journal reporter, "This place stinks." The smell was compared by him to that of a thousand outhouses upended by pranksters (and I am sure we all remember Halloween many years ago)—or of 500 rotten eggs in your kitchen—or of a living room full of fertilizer. As you might expect, the enraged residents of Eastwood are militant in their demands that the offensive odors be eliminated. While the city of Kalamazoo has endeavored to ease the problem and has expended nearly \$100,000 in attempting to do so, its measures have been but stop-gap and completely unsatisfactory.

The city says that addition of an oxidation system to the plant would solve the problem, but this would take anywhere from 1½ to 2 years to complete. In the meantime the residents of Eastwood are trying to close down the plant and have sought a court injunction in order to do so.

Anyone who has caught a whiff of the treatment plant at Warm Springs, as beneficial as its effects are upon the Clark Fork River, can easily imagine such a result in his own community and the discomfort that the people would feel. As I read the article, since we in Butte are building a new sewage treatment plant which is expected to go into operation shortly and is on the other side of town from the prevailing wind, I couldn't help but ponder what will happen when that plant becomes operative. I hope nothing adverse.

As a final example of the interaction of environmental control efforts—development of the asbestos brake lining which has so improved the braking efficiency of our automobiles was a technological advance which everyone would hail; however when you apply your brakes, the very act of braking by all of us has led to increased exposure of the public to asbestos particles and there is substantial scientific evidence which would indicate that prolonged exposure to asbestos is a factor in the incidence of lung cancer.

It is clear then that in embarking on a course of environmental control we must consider the total effect of our actions, their impact on other aspects of our environment, and our welfare and economy. Further complicating such total action efforts are the hard facts that our knowledge and technology are incomplete at this time; hardware to do the job we wish to do may be presently undeveloped; and its manufacturing and construction lag-times may mean delays of from one to three years in vital pollution control programs.

Now all of what I have said is not to suggest that the problems in attaining clean air are insurmountable or the state of our knowledge or technology is so imperfect that progress cannot be made and therefore control effort is wasted and should not be so interpreted. This is not what I am trying to say.

Our goal of clean air is attainable if we pursue it energetically and realistically. Our goal cannot, however, be attained by government or industry alone regardless of how much money we spend. It can only be attained by the meaningful support and cooperation of the public. To accomplish this we must all be made aware of the real effects of pollution in our environment, of the colossal amounts of waste and contaminants that are discharged to the atmosphere and of the part we each play in contributing to this total degradation of our life source. We also must accept the expense to be incurred in reversing the trend of centuries past and we must be willing to take the steps and extend the time required to effectively and realistically attain our desired end.

When we as individuals are as familiar with the facts of air pollution control as we are with the need for forest fire prevention and the elimination of littering perhaps then we will assist in the achievement of environmental goals as we do in complying with the "Smokey Bear" and "Anti-litter-bugging" campaigns.

If this is done, a great step forward in reverting to the past (I am speaking of levels of pollution) will have been taken.



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Focus On Consumer Protection

MARJORIE KEISER, Ph.D.

ABSTRACT

Included in man's environment are the consumer goods with which he surrounds himself. Today's society makes it impossible for him to produce and thereby control everything he needs. His expertise in only one phase of production negates his ability to make wise selection of all consumer goods and services. In addition the average United States consumer is a young rather low income female who has attended but not graduated from high school. Fortunately she is aided by the government, industry and various consumer protection groups. These aids come in the form of regulatory legislation and informational bulletins of the federal government, seals and various other insignia from business, point of purchase information as labels, hand tags and care and use booklets from the manufacturer and self regulation through trade organizations and better business bureaus.

Safety of goods and services and freedom from fraud seems to be the basic factors in the consideration of consumer protection activities. It is not always possible to determine if a product is safe by making an overt examination nor is the language of agreements always readily understandable. Several approaches to solution is possible—more legislation establishing grade standards, controlling prices and inspecting of producer conditions to assure safety and health; more self regulation by industry, or greater emphasis on consumer education. The goal should be a balance between consumer protection and producer interest. Montana must choose the approach which will be in the greatest interest of her citizens.

* * * * *

Most people relate pollution of the environment to air and water, but according to Mr. Webster, the true definition of environment is "the whole complex of climatic, edaphic and biotic factors that act upon an organism or ecological community and ultimately determine its form and survival." From this definition we can hypothesize that man, either by himself or in groups, is effected by his surroundings. Air and water are only one part of it, the climatic part. Man, the individual, is also surrounded by the edaphic and biotic factors of the environmental complex. These include among other things, the house in which he lives, the equipment with which he works, the clothes he wears and the food that he eats. There was a time perhaps that man was able to produce his own housing, tools, food and clothes. Our present society is much more complex. An individual man is no longer able to produce everything he needs; and therefore becomes an expert or specialist in the production of one of them and purchases the remainder. When he makes a purchase—"spends money" in today's parlance—he becomes a consumer regardless of his expertise in his productive activities. When it comes to these spending activities he is definitely backward. It behooves us, therefore, to determine the characteristics of the average consumer, note the aids he is given to perform his purchasing activities, determine what protection he may still require and offer possible solutions.

Who is the consumer—What is he? Anyone who spends money can wear this label. In the United States there are 200 million citizens. Only a handful of them do not spend money. In April 1966, the United States Census reported that about 20 million persons were senior citizens, 24 million were between 18-24 and about 94 million could be classified in the work force. Twenty-nine percent of the population were under 14 years of age. Of these 62.8 percent were in elementary school or between age 6-12. This makes the average age of our United States consumer somewhere between 25 and 34.

The United States prides itself in the amount of education of its citizens and this should make some differences in his approach to spending. Referring to the census figures again we find that 1.3 percent of our citizens 14 years and older have attended no school at all while 18.6 percent have attended college. Of these, however, only 8.4 percent have obtained a degree. Most of them, 52.7 percent in fact, have attended high school. This means that our average consumer will have attended 11.8 years of school not quite attaining graduation from high school.

Income, too, affects our spending patterns. In the United States 22.6 percent of the workers earn less than \$1,000 a year with which to purchase his needs. At the other end of the wage scale only .6 percent report an income above \$25,000 per year. Our Mr. Average then would have an income of \$3,301.

Age, income and education all play a significant part in how man spends his money. There is another factor which has a direct influence on the consumer's purchasing decisions. This is his attitude or belief system. These are centered around values or things regarded as important, even precious to him. Each consumer has his own value ranking and attitudes when he gets ready to make a purchase. In-

evitably some attitudes are formed as the individual attempts to satisfy his basic needs. Favorable attitudes develop when buying of the service or object satisfy his needs, while unfavorable ones develop when attainment of needs are blocked.

Aspects of personality such as motive, intelligence, aptitude and appearance will have their effect too, but the two major forces in attitude development are the group with whom he associates and the information he has about items he desires to purchase. Of all the groups—family, church, work—that play a part in the development of a consumer's attitude probably the most influential one is the family. Individual family members not only have a more intimate and lasting association but act as a group spending unit as well, in order to procure a way of life more commonly called "standard of living." It is the only one that has such an inefficient method of procuring its goods and services. The primary cause is the structure of the family itself. The typical United States citizen is a member of two families—one into which he was born and a second which he helps to form. This gives rise to several sociological situations which effect buying behavior. As new families are formed authority of the elders is rejected. Independent young couples must rely on their own resources consulting each other rather than soliciting advice from those with experience. Further frustrating intelligent consumer purchasing is the use of material objects to establish status among strangers. The tendency is to keep up with the Jones' or as Veblen calls it, conspicuous consumption. Many times, therefore, the easy way out is to follow custom and tradition in making our purchases—selecting items for their symbolic authenticity rather than instrumental efficacy.

The family, moreover, has not developed its purchasing potential like organized business. Usually, the role of family purchasing agent is assigned to the wife. This activity is secondary to her principal responsibility of wife and mother. In addition, her buying skill may be lacking. The very multiplicity of items to be purchased limits her competency.

Our average consumer then is a rather young low income woman, who has attained high school but is not always a graduate. The young individualist of the advertising campaign is not too inaccurate a picture.

In this technological age she has resisted the development of consumer skills partly because of inertia and replaced it with conventional buying habits, standards of tastes most likely based on money and at the same time she has a feeling that a concern about money is demeaning.

Fortunately there are aids for the consumer who knows how to use them. These are provided by the government, by the producer and by various consumer oriented organizations. Most of them are in the form of information, some as regulatory legislation. Thirty-three Federal departments, agencies or commissions claim to have "consumer activities" in their programs. In 1961 these departments and agencies directed 103 activities meant to protect the consumer, at an estimated cost of \$272 million with the help of approximately 22,000 employees. If we add the 193 activities labeled consumer advancement, the consumer protection bill for that year was increased to \$681 million and the number of employees to 43,000. For this year it has been estimated that the cost of government consumer protection activities will be about \$1 billion or approximately \$5 per person per year.

Consumer legislation began around the turn of the twentieth century when two important Federal agencies were established. First let's consider the Federal Trade Commission. This commission is composed of five members appointed by the President. Its primary objective is the maintenance of free and fair competition. Their major work is law enforcement relating to false advertising and other unfair and deceptive acts in commerce. In addition to regulation of unfair advertising, the commission administers a number of labeling and fiber identification acts. These are the Wool Products Act which requires labeling of type fiber content used in wool products, assuring the consumer as to whether virgin or reprocessed wool was used to make garments or household products. The Fur Products Act prohibits the use of false names for furs. Rabbit must be so called under this law. The Flammable Fabrics Act forbids the use of highly flammable fabrics and finishes. Many of the man-made fabrics have high flash points. These must have a flame retardant finish or be combined with non-flammable fibers.

Last but not least is the Textile Fiber Identification Act. This goes beyond the Wool Act by requiring all fibers to be identified in finished products.

Another important authority is the Food and Drug Administration. It is part of the United States Department of Health, Education and Welfare. Its responsibilities include the definitions and standards for identity for food and drug products, checking the accuracy of advertising related to food, drugs, cosmetics, and allied products, for checking on purity and quality of products and the conditions under which

they are produced. Inspectors visit manufacturers engaged in interstate trade and make suggestions for voluntary corrective action or give the manufacturer a "clean bill of health." In general, there must be inspection by the manufacturer of all products entering his plant. This includes determination of the presence of pesticides or insecticides on fresh fruits and vegetables. Normally this is established by gas analysis. The manufacturers must assure quality control of product during manufacture and maintain sanitary handling techniques to assure a pure product. Satisfactory storage facilities must also be provided. When voluntary compliance is not obtained, court action can be taken. Misbranded products may be seized by Federal Drug Administration agents.

A fourth activity of this body is to develop standards for content. This includes such things as preservatives that may be added to foods, or the definition of words that are placed on labels. When new labeling was discussed for ice cream, for example, 26 different designations were required to differentiate just the vanilla mixtures. Very few consumers realize the difference in wording when they send Johnny in for a quart on a hot summer's eve.

Until 1963 drugs and medical preparations for human use had to be safe for human consumption and chemical food additives must have been proved harmless to human beings. In 1962 the law was amended to make it mandatory to prove efficacy as well as safety for all new and prescription drugs prior to marketing. It also required all drug manufacturers regardless of where output was sold to register with the Federal Drug Administration and be inspected once every two years. Still other changes had to do with placing given names as well as brand names on labels and certain restrictions concerning contra-indications of drugs on both labels and in advertising. One must remember that some proprietary or over-the-counter drugs do not have to come under this act since they were marketed prior to the passage of the law. One of the interesting recent developments is the reminder statement on vitamin tablets that if one makes the correct selection of food the needed daily requirements for vitamins and minerals can be supplied. Research from United States Department of Agriculture shows there are definite nutritional deficits in our citizens' daily diets. Either they need the tablets or perhaps more knowledge of selecting the correct foods.

Most of the work of the United States Department of Agriculture is informational and voluntary—it does have some regulatory responsibilities. One has to do with labeling of products containing bactericides, pesticides, and insecticides. Most of the former are laundry products and have to do with the transmission of disease while the latter have to do with garden and lawn products. Their newest responsibility is to implement the Wholesome Meat and Poultry Act. This bill assures the consumer that meat and poultry are pure and that it was packed and processed in a sanitary plant. Under this act a state will have up to three years to enforce a meat inspection program for intrastate products equal to the Federal program.

Last, we have the Post Office. This department has the oldest regulatory legislation. Enacted in 1872, it protects the consumer from fraud when United States mail is involved. None of these federal groups can regulate any of the large number of consumer products that do not move across state boundaries and therefore are not subject to compliance. States, on the other hand, have not been as active as the federal government in consumer protection although there is a trend in this direction. In 1959 only three states had consumer programs. This increased to 14 in 1963 and 26 at the present reading. Most of these come under the auspices of attorney general or an advisory council.

Government, however, does much more than regulate the marketing of consumer products. There is also an effort to provide information. This is done by making available bulletins and even books on consumer topics and subjects. This information is distributed through the United States Cooperative Extension Service, or available on request from the United States Government Printing Office. Still another way the federal government furnishes consumer information is by means of grading agricultural products and setting of standards for government purchasing agents. Grading of fruits, vegetables, meats and eggs is voluntary and the information is not always found at the retail level.

As noted earlier business also provides consumer aids. Their greatest weakness is a tendency to exhibit only the advantages of products and to say nothing to make the consumer aware there are disadvantages. Nevertheless, helpful information is afforded if the consumer knows how to use them. Chief among them is advertising. Many benefits can result from informative advertising. It alerts the consumer to new products and how to use them. It can supply new uses for old products. Often it tells where it is available, at what cost and when. The consumer must remember, however, that the chief purpose is to create sales. In most advertising, therefore, superlative descriptions are used with no basis of comparison among the items. Often appeals are made to the status symbols which the average consumer aspires.

Besides advertising, producers also supply point of purchase information. Sometimes this is only a sales person who may be as ill informed concerning the attributes of the commodity as the consumer himself. Usually much more valuable information is available on labels, hand tags, leaflets or instruction booklets. In general, these contain the name and address of manufacturer, contents, brand name or trade mark, size and style, directions for use.

Trade associations supply educational information. Many have consumer or home service consultants. Those concerned with food such as the Livestock and Meat Board provide complete and accurate information on the use, nutritional values and preparation of foods they promote. Others such as the National Institute of Dry Cleaning provide cleaning instructions and information about textiles—both fibers and fabrics. Producers of gas and electrical equipment for household use have established safety and minimum performance standards. Notable among the efforts to provide factual information is the Techniques for Products Selection booklet available from the National Association of Manufacturers. This product, for use by educators, catalogues materials available from all manufacturers belonging to the association as well as giving important characteristics and problems about specific items of food, clothing, appliances, and housing.

Better Business Bureaus, both state and national, have been interested in truthful advertising, protection of the consumer against exploitation and providing aids to the consumers in their quest for attaining full value of their money. They have produced and distributed millions of fact booklets concerning consumer products. Complaints from both business and consumers are investigated.

A still more direct aid is the standard setting, testing and certification programs sponsored by industry. The top agency dealing with standardization and testing methods is the United States Association of Standards Institute formerly known as the American Standards Association. Organized in 1917, it evolves voluntary standards and test methods. Membership includes trade associations, governmental agencies, and over 2,300 business concerns. Before a standard can be accepted it must have general acceptance of all groups concerned with a particular product. They have helped establish many standards that reduce safety hazards faced by the consumer.

American Society for Testing Materials is the second most important testing agency. Like United States Association of Standards Institute this society concentrates on standardizing aids for industry. They have been instrumental in establishing test methods for textiles.

Just as brand names can be used as identification of certain manufacturers, seals or certification programs are promoted by business and professional organizations to help the consumer identify certain quality minimums. American Gas Association tests gas equipment and awards its blue star seal to assure safety of gas products. The gold star is a symbol that the products meet certain performance standards. New appliances are tested in the Association's laboratories in Cleveland, Ohio, and annual field inspections are made at the factory. The red and gold Underwriters Laboratory seal informs the purchaser that the original test in the laboratory and factory field tests of the product have met standards for electrical safety. The seal is affixed to that portion of the appliance that has been tested.

A number of magazines stress consumer information. Some of them maintain testing bureaus. Two of them, *Parents Magazine* and *Good Housekeeping*, award seals to commodities advertised on their pages. Standards for testing are the advertisements themselves. Two others, *Consumer Union* and *Consumer Reports*, rate products and publish results. Attempts are made to remove bias by accepting no advertising. For intelligent use of all these programs, however, it is important to know the standards for testing, the test method used, the results and what recourse the consumer has if products fail to meet requirements.

With all these aids from government, industry and voluntary organizations, what more does the consumer need? Perhaps the President's consumer message report of this January will help. May I quote:

For 1968 I propose a new eight point program:
Crack down on fraud and deception in sales.
Launch a major study of automobile insurance.
Protect Americans from hazardous radiation from television sets and other electronic equipment.
Close the gaps in our system of poultry inspection.
Guard the consumer's health against unwholesome fish.
Move now to prevent death and accidents on our waterways.
Add new meaning to warranties and guarantees and seek ways to improve repair work and servicing.
Appoint a government lawyer to represent the consumer.

The President is concerned with wholesome food, accidental death, service and repair work and agreements made about the sale of goods including the provision of a referee.

The legislation of the past and those proposed for the future show a tendency to protect the health and safety of our people as well as to safeguard their money.

Consumer protection might be defined as safeguards, both private and public, in the production and distribution of goods intended for use by the ultimate consumer. One may wonder then where accidents occur so that future safeguards could be initiated in these areas. Accidents on the highways cause the largest number of deaths. Well engineered highways and cars with safety features can help but as one traffic authority puts it—most accidents are caused by people—people therefore must prevent them.

The home—man's sanctum of peace and security—rates second in accidental deaths and is the place of more major injury each year than any other. Within the home, the kitchen is the most frequent site of accidents. This is followed by the yard and bedroom. Interestingly, but not surprisingly, more women are injured in the kitchen, more males in the yard and children in the bedroom. The most frequent accident in the kitchen is classified as cut with a knife while using. In the laundry, the wringer on the washing machine seems to be the culprit, while broken dishes and glassware account for accidents while dishwashing. Falls account for at least one-half of the accidental home deaths, 50 percent of the minor injuries and 45 percent of the major ones.

Summarizing then, it is most probable that home accidents sustained by an adult occurs to a woman while in the kitchen preparing or cooking food who if she sustains a fatal accident or is disabled has fallen but if she recovers has cut herself while handling a sharp instrument.

Unfriendly fires in the home are also a danger. Fires were listed number two in the consideration of home accidents. Their main cause are faulty heating and smoking equipment. Only 14 percent are attributed to electricity. This would mean that out of every 100 fires only 4 can be charged to electricity—general house wiring and/or appliances.

Three types of home accidental deaths involve children—mechanical suffocation, poisonings, and firearms.

Poisonings can result from an attempt to rid the house of insects by the use of pesticides. There are effective pesticides on the market that are non-poisonous to humans. Unfortunately those that can be fatal are not prohibited from sale. As summarized in the 1965 Yearbook of Agriculture—"You can rid your home of practically all pests, keep it free of them by a combination of good housekeeping and the proper use of the right pesticide at the right time."

Accidents from electric shock ranked extremely low and no figures concerning radiation from TV's or electronics equipment are available.

It is clear that in formulating legislation, home accidents have not been the criteria for establishing consumer protection. If fires and pesticides do not constitute the basis for consumer protection, what does? According to the late President Kennedy—each consumer has the right to be safe, to be protected against the marketing of goods that are hazardous to health and life.

Unfortunately almost any item that the consumer buys may have inherent hazards that are not easily observable on overt examination. Furthermore, regardless of actual knowledge the consumer considers himself an expert on almost everything he needs.

Research indicates there are four major features on consumer products most likely to cause accidents. These include:

1. Materials of construction.
2. Finish.
3. Workmanship, design and construction.
4. Functional and operational aspects.

It is not feasible to describe in detail all of the test methods for the hazards just listed. In most cases, the great variety of products on the market and the diversity of materials, designs and operating characteristics, require that the tests conducted need to be designed for the particular article under consideration.

Far more interesting than potential hazards or the type of tests, is consideration of the possible injuries that could be caused by products. Most of these products are child oriented but can be related to adult ones.

One item that makes headlines is the home swimming pool. Children love water—it's fun, cooling and refreshing in hot summer weather. Most of the danger comes from the possibility of drowning. One must recognize that it is possible to drown in a cup of water or a bathtub as well as a swimming pool. It is helpful if a method of egress is provided so that the child cannot operate it without help. Other hazards related to swimming pools deserve equal attention. Pool filtration and chlorination units may be too small or be inefficient or ineffective.

The developing child is interested in the world around him. He wants to know what makes it tick. Laboratory kits are popular because they have both educational and entertainment possibilities. They might also contain, however, items with high toxicity or have hazardous experiments which produce flames or explosions.

Probably the most innocuous child's toy is the stuffed animal. Children are often inseparable from their favorite one. It is difficult to remember when one sees these delightful toys that it might incorporate a hazardous situation. Perhaps parts might be extractable or be toxic. It is important to know if the toy can be cleaned, the method for doing so as well as what happens as a result. If the seams separate, the stuffing can be removed. Others have eyes, manes, whiskers or tails that can be pulled off and eaten.

Many other examples might be listed but these serve to show it is not easy to design hazard free products. Toys represent only a very small part of the consumer market. Forty percent of the money we spend goes for food. We eat to live, grow, keep well and get energy for work and play. What you eat therefore, influences what you can do and how you feel. Nutrition is the science of knowing the foods that will promote well being, health and vigor. It is easy to know more about it than you understand.

One consumer in 19 spends \$50 a year on unnecessary or falsely represented vitamin products or health foods. All told this type of health food costs the consumer more than \$500 million a year. More than money is involved, however, because ignorant or unscrupulous promotions may distort the facts and claim benefits against diseases or symptoms that are not caused by dietary deficiencies. Geritol advertising about curing anemia of a few years ago is case and point. The current rainbow type weight reducing pills, which are suspected of being responsible for the deaths of six women in Oregon, are another.

Because of modern food processing, it is possible to maintain the same basic diet at all times. There are five basic methods of processing food—canning, freezing, dehydration, chemical and irradiation. Each seeks to destroy or inhibit microbes, enzymes or prevent oxidation. Care must be taken to prevent recontamination and subsequent growth of organisms in sterilized food.

When the consumer goes to the market, she must be able to choose wholesome foods. Her responsibility includes not only obtaining the correct amount but making the correct selection; and then using the proper home processing methods and procedures.

Clothing is generally accepted as one of the fundamental needs of individuals and families the world over. Moreover, clothes are of such intimate concern we are apt to think of clothes as a part of ourselves—a second skin so to speak. At first blush, modesty is considered the primary basis for all clothing. Others believe to the contrary that the reason we wear clothes is to call attention to the body.

Just as basic, however, is the protection and utility clothing can provide—making a buffer between man and his environment, shielding him from physical and psychological elements. Thus, clothing can contribute to the health and safety of the body. It can also be the indirect cause of skin irritations, infections, or other physiological problems. When the consumer goes to purchase clothing, she must remember that functionally designed clothing greatly increases her versatility and enhances her performance in various kinds of activity, as well as establishing status.

Home appliances offer a family convenience and sanitary living conditions. Each family has an equipment investment of between \$1,500 to \$3,200—the average being about \$2,000. This covers the cost of approximately 12 appliances most of which are purchased during the first few years of marriage and replaced when needed. In many cases replacement occurs just when children's needs begin to run up. Average life expectancy of major appliances range from 10 years for a washing machine to 16 for the refrigerator.

When the consumer purchases an appliance she wants good performance—she expects safety. The appliance industry takes pride in its record for consumer concern. Safety standards for appliances have already been discussed. This does not mean appliances cannot be made safer. The greater consumer concern is obtaining maximum performance.

On the preface page of the *Household Equipment* book, often used for a text in college classes, are the words, "The equipment does the work but the hand gets the credit." Many times teachers hear, "The cake I just baked did not rise. What's wrong with the oven?" — or — "That last load of laundry wasn't clean. What's wrong with the washer?" To the user the fault is always with the appliance.

As yet no appliance has been designed that turns out perfect products. The biggest problem encountered for the operation of appliances or assembling toys is to get the consumer to read instruction books. This communication gap has widened still further because many of the appliances on the market today were not available to grandmother or even mother and unlike the automobile that has undergone similar synthesis, there is no license needed to operate them.

Service is still another concern. In spite of the manufacturer's claims of fewer and more interchangeable parts, nothing can be more irritating to the homemaker than a load of clothes in a washer that won't operate. A long wait for the service man only to be told—"I'll have to send for the part—it will take three weeks."

One more comment about appliances. Some household appliances bear special relationship to environment—garbage disposers, incinerators and air conditioners. Today about 100 cities require disposers by ordinance in all new construction. None have a ban against it—sanitation and other benefits seem to outweigh problems at the sewage treatment plants. Home incinerators are on the increase, also. It provides a good means of ridding the home of waste. Most of them are the smokeless variety. But what of those that are not? Last but not least there is the air conditioner. This item is no longer limited to the cooling of air but has as part of its purpose the "simultaneous control of temperature, humidity, air motion, air distribution, dust, bacteria and odors within a structure to provide for human health and comfort." Today's small window conditioner can warm air in the conditioned space as well as cool it by reversing the cycle. Determination of the influence of the appliances whether positive or negative on man's total environment should be appraised so that proper recommendations can be made.

Several conclusions may be drawn from the foregoing discussion. First the consumer is of an age, background and income that indicates the need for help when purchasing goods and services. To date our system of consumer protection is a three-way partnership involving prudent management of purchases, efforts of producers and retailers to serve the consumers and regulation of marketing mostly by federal government. Emphasis has been on safety and performance of product. This, however, does not seem to be enough. What should Montana do to provide a good environment for its citizens through consumer protection? A step in this direction would be to encourage industry to provide informative labels as well as truthful ones. Items on a label need to be accurately worded, refer to test methods used for quality or specifications and list both good and bad features of the item. Some say that quality standards should be required for all products with a major objective of how good it is or how poor. Quality-rated products are already available in stores—meat, for example. Quality ratings on the majority of products remain to be established. The problem is who is to establish them and how long would it take. One way to establish standards would be with a committee to work on test methods, specifications and items to be included in the label. There must also be ways to help people understand what the label says. Such an agency would be a combination of the present United States Department of Agriculture to grade products and a regulatory body to see that they were labeled properly and that all competitors lived up to standards. This might deteriorate quality goods because processors might tend to meet minimums or consumers might think grades below A or 1 were not desirable.

Another approach is the establishment of a consumer testing bureau that is supported jointly by government subsidy and individual membership. Several foreign countries have pursued this type of action. Those in Scandinavia are particularly effective.

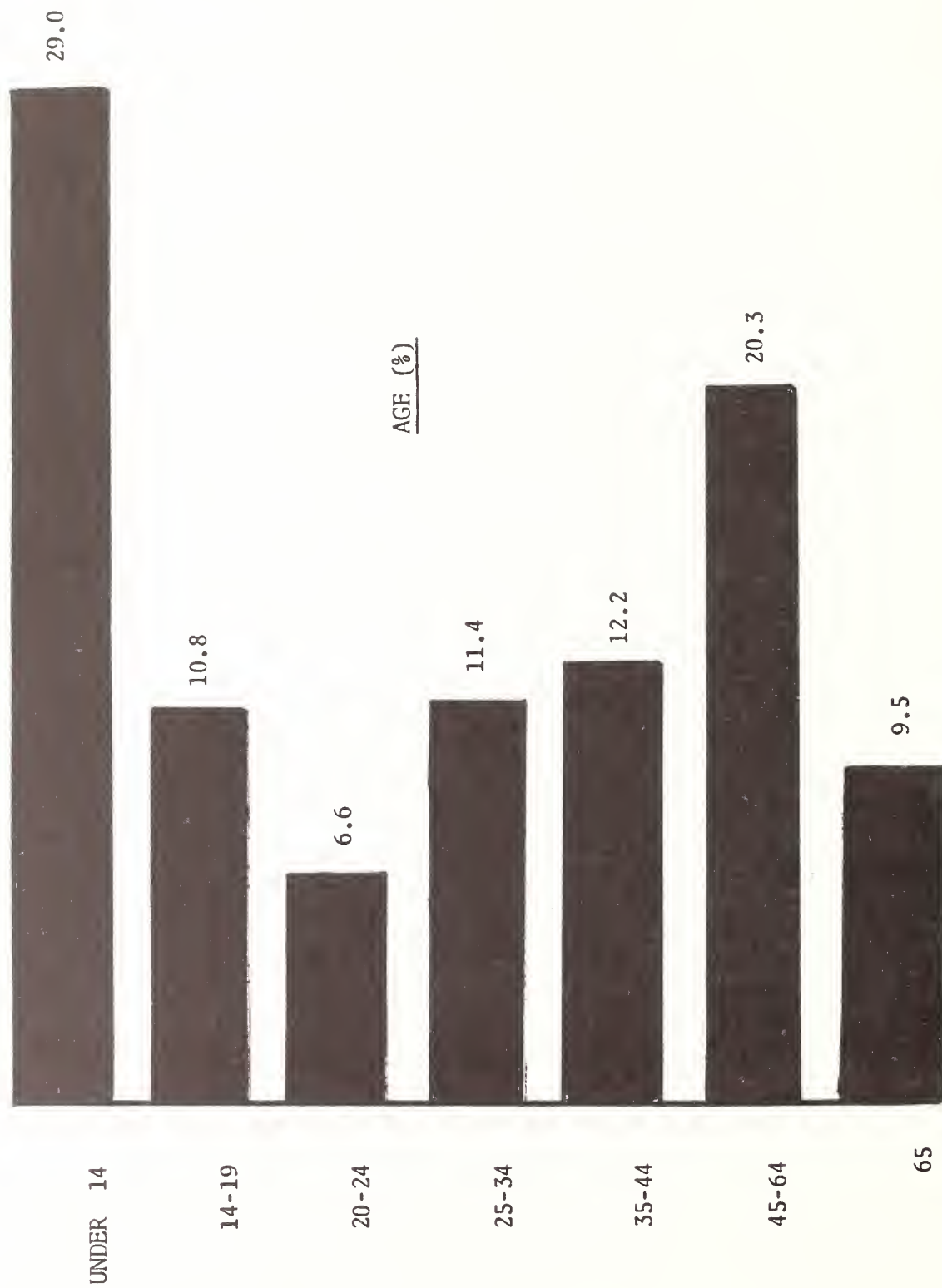
Stimulation of self regulation on the part of the business community is another possibility. Many states have Better Business Bureaus, as mentioned earlier. Certainly such an organization could have been helpful in several of the advertising and pricing scandals that have been in the Montana newspapers recently.

Fourteen states have established consumer councils under the attorney general's office. In the main they investigate and prosecute frauds against the consumer, many of which were brought to the attention of the bureau by complaints of the consumer himself.

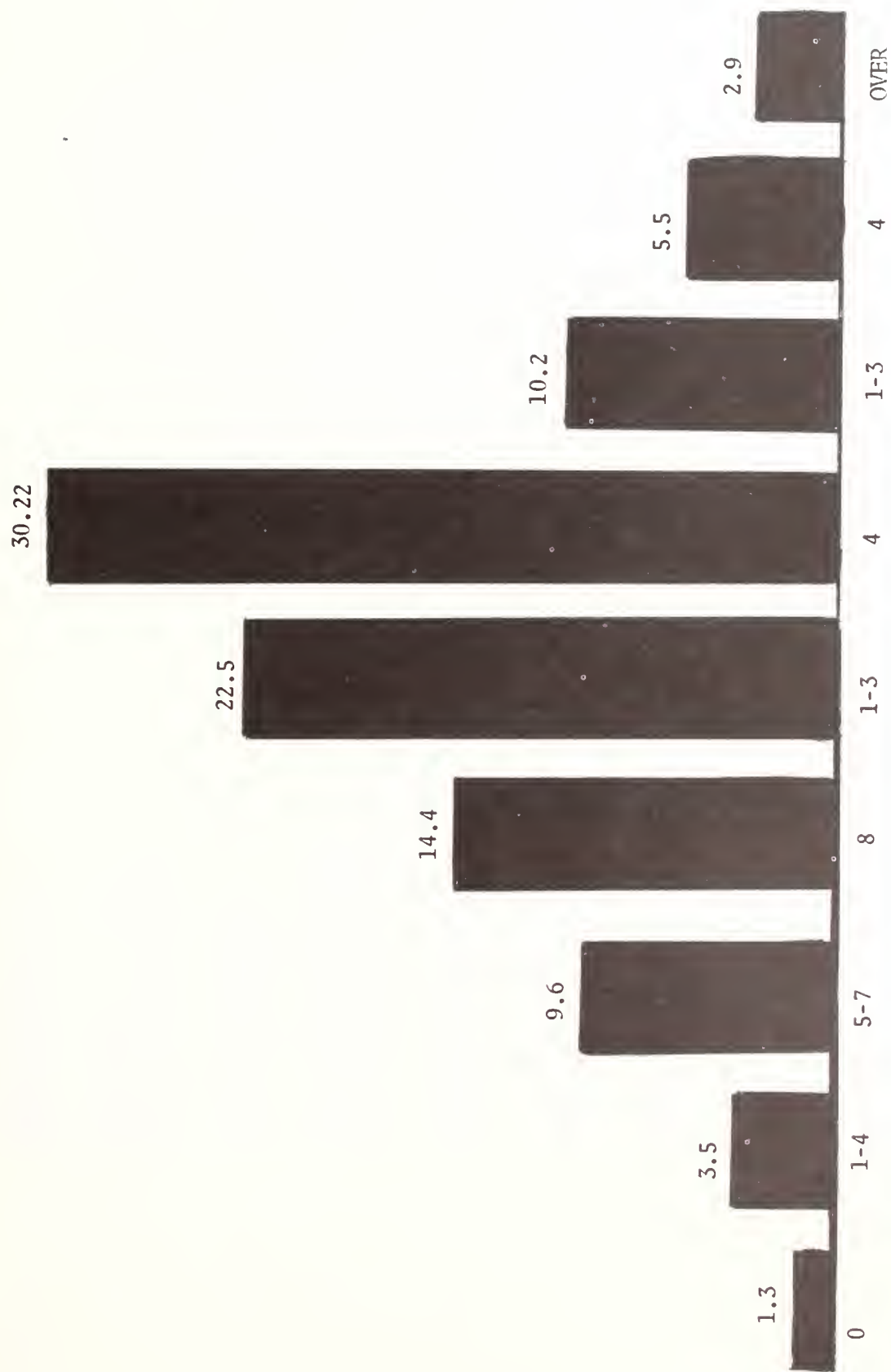
Last but not least there is the possibility of improved consumer education. Many consumer problems can be resolved by improved individual consumer skills, information and attitudes. After all, our welfare is determined as much by how well money is spent as how much is produced. Since our average consumer does not complete high school it becomes evident that consumer education must be incorporated into our school systems prior to the 12th grade. Provisions are made in Montana's Vocational Home Economics Program for the study of Home Management in both Junior High and Senior High School. There is also a Senior course in preparation for adult living in which the consumer aspect played a conspicuous part. What is the percentage of the total school population, however, enrolled in such courses? Are boys as well as girls encouraged to enroll? What about the college-bound student?

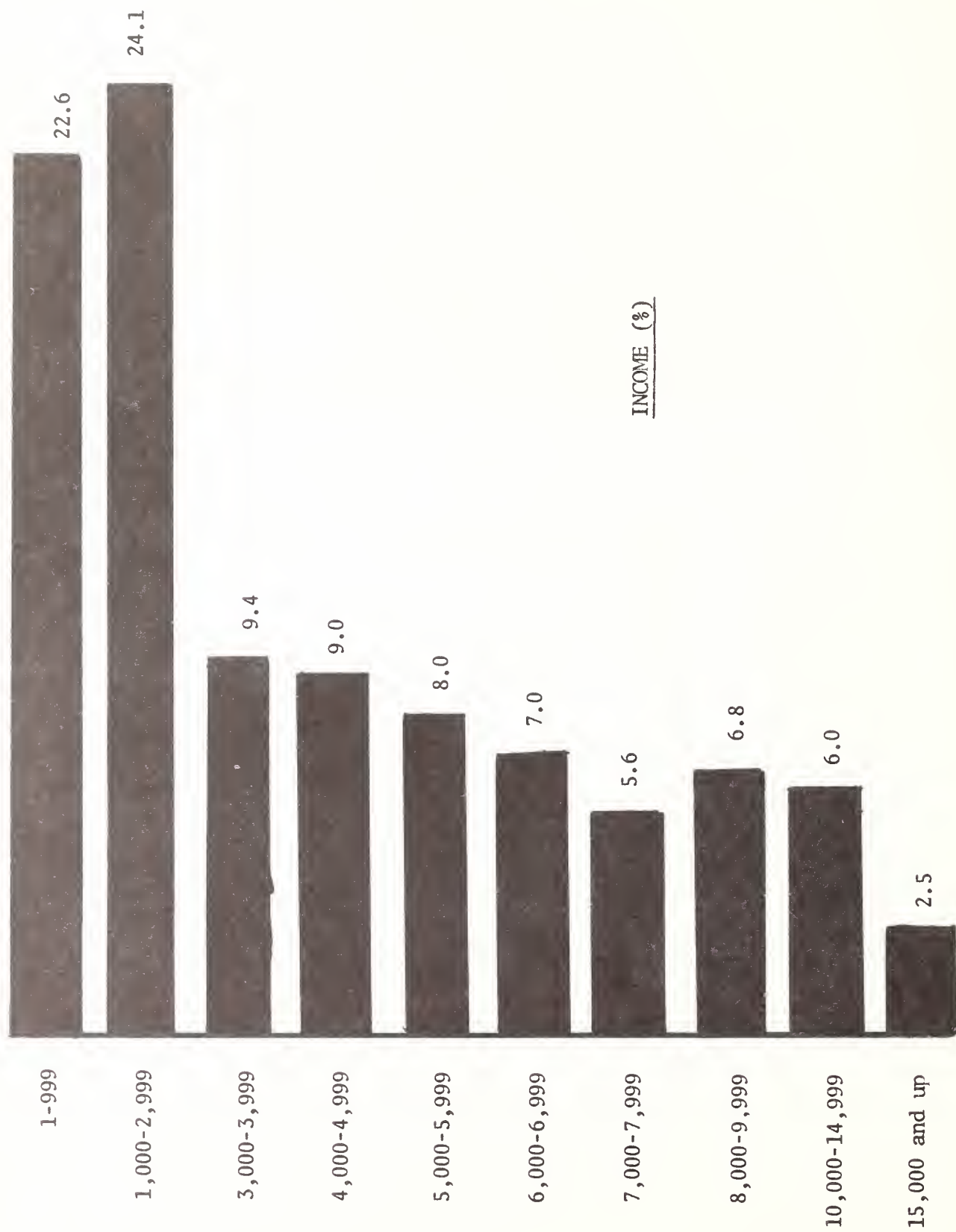
Consumer education need not be limited to schools of the state. Extension agents could aid the adult program. It is my understanding that the home management specialist who would be a key person in the advancement of the extension consumer education program recently retired and is yet to be replaced. In view of the need, one wonders how long the position will be left vacant.

Home economics through school and extension programs is not the only place of consumer education in the curriculum. The education consultant for the President's advisor on consumer affairs prefers an interdisciplinary approach. His program while involving the home economists also includes other high school teachers such as the mathematicians and social scientists. Prudent consumers, ethical producers or government legislators can effect consumer protection. Perhaps all are needed. In any event, a desirable balance between consumer protection and producer interest is required. A bill was introduced in Congress on March 11 of this year that would make \$9 million available as a grant in aid assistance to states offering consumer protection programs. Certainly Montana should be ready to qualify for such aid. The choice is yours—what shall it be?



LEVEL OF SCHOOL (%)





TRADE ASSOCIATIONS

AMERICAN GAS ASSOCIATION

ASSOCIATION OF HOME APPLIANCE
MANUFACTURERS

GROCERY MANUFACTURERS OF AMERICA

LIVESTOCK AND MEAT BOARD

MOBILE HOMES MANUFACTURERS
ASSOCIATION

NATIONAL DAIRY ASSOCIATION

NATIONAL ASSOCIATION OF HOME
BUILDERS

NATIONAL ASSOCIATION OF
MANUFACTURERS

NATIONAL INSTITUTE OF DRY CLEANING

NATIONAL PAINT, LAQUER AND VARNISH
ASSOCIATION

SOAPS AND DETERGENTS ASSOCIATION



RICHARD McCONNEN, Ph.D.

*Professor of Agricultural
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Water in the Environment

RICHARD McCONNEN, Ph.D.

My view of the role of water in a livable environment for Montana is conditioned by my training as an economist. I think of water not only as something that can be polluted, but also as a resource that can be used to produce goods, services, jobs, tax dollars, and perhaps pollution.

A strategy for water in Montana is nothing more than a set of guidelines for decisions, a series of decisions, about water uses that we will make in the uncertain future. We want a strategy which will do more than give us a livable environment. We want, need and demand a strategy that will give us the *best possible* livable environment.

Part of our environment will be determined by our ability to earn a livable income. In large part, the economic growth of a community, a region, or our state will depend on its *economic base*. Economic base is defined as the ability to produce goods and services for outside markets. The economic base provides the income needed to pay for the residentiary goods and services provided by both the private and public sectors.

A strategy for water in Montana which will develop the *best possible* livable environment must consider the use of water to expand our economic base. Along these lines I will repeat a proposal here that I have made earlier.

Other proposals could and should be made. All of these proposals should, insofar as possible, be (1) quantified, and (2) have a specific time horizon. If proposals are meant to lead to action, they cannot be general; they must be specific.

My proposal has to do with irrigated agriculture in Montana. The present status of irrigated agriculture is presented in Column 1. Column 2 summarizes what interns a "Modest 10-Year Goal." This goal could be largely realized by better use of existing irrigation developments and the more extensive use of ground water.

TABLE 1. IRRIGATED AGRICULTURE—A "MODEST" GOAL FOR THE FUTURE

	Column 1 Present Base Figures	Column 2 A Goal for the Future (10 years from now)	Column 3 Percent Change
Gross \$	\$80 million	\$160 million	+100%
"Net" \$ ^{1/}	\$10 million	\$ 15 million	+ 50%
Acres	1.6 million	2.0 million	+ 25%
Gross \$/acre	\$50.00	\$80.00	+ 60%
Ac. Ft./Ac.	4.0+	3.5+	— 13%

^{1/} No reasonable estimate of net income exists. The figures used here are for purposes of illustration.

Such a proposal is not without problems. First, much more cooperation than we have seen in the past is required between state, local and federal agencies as well as the university system. Second, possible serious conflicts involving stream dewatering and pollution have to be spelled out and resolved.

Now, let me turn to the problem of water pollution. Water pollution can have a direct measurable impact on environment. Polluted water can cause disease; treatment costs can be increased; and useful aquatic life can be destroyed. In addition, polluted water can have an impact on our symbolic environment which may be impossible to measure. We have an *image* of what our environment should be like. I think most of us think of Montana not only as the "Land of the Big Sky" but also as the land of clean water. When, for example, polluted water kills fish or stream beds are choked with silt, we are often concerned about more than the direct measurable impact on environment. Our primary concern may be that our *image* of the land we live in has been violated.

Why does anyone pollute water? On occasion, the cause may be ignorance. Usually, however, water is polluted because it is cheaper for a man to pollute water than not to pollute water. A polluter is not an evil man. It is just that some of the costs of pollution are *external* to his operations. An "Act of God," e.g., a heavy rain, can convert an "Act of Man," e.g., applying insecticides, into a tragedy for both fish life in a nearby stream and for the neighbor's livestock which drink from that stream. No evil intent need be involved. The occurrence of pollution can be unpredictable. The costs of pollution are often external to the polluter. The actual cost is borne by someone else.

Pollutants can be *degradable*. When organic material is dumped into a stream, the stream starts the process of self-purification. If the waste load becomes too great, the biochemical oxygen demand (BOD) becomes too great, and for example, fish will die. If dissolved oxygen is exhausted, degradation will take place anaerobically. You don't need an expert to tell you when this occurs. A foul odor is produced. "Indeed, the unbelievably foul odors from the Thames in mid-nineteenth century London caused the halls of Parliament to be hung with sheets soaked in quicklime and even induced recess upon occasion when the reek became too suffocating." Today, the impact of degradable pollutants need be less direct to prompt political action. Degradable pollutants are the most easily measured and with our present technology, the most easily and economically controlled.

When a stream carries *non-degradable* pollutants, it does not clean itself. Ordinary salts and salts of some heavy metals are non-degradable. To deal with these pollutants, we can distill water, use water softeners, use extra soap, or use clean water to dilute the pollutants.

There is a third group of pollutants which has been called *persistent*. These are of relatively recent origin and of increasing importance. Some of the best examples are synthetic organic chemicals such as pesticides. It is difficult and expensive to detect these kinds of pollutants. The results of such pollutants can be dramatic and long lasting. Treatment is often not technically feasible and at best very expensive. In the future, I expect that these persistent pollutants will become one of our most serious water pollution problems. In Montana, agriculture will probably be the most serious source of persistent pollutants.

If we are to develop a strategy for water pollution, we must do two things. First, we must find means of estimating the "cost" of water quality deterioration. This "cost" may be in terms of both measurable losses because of pollution and because of some non-measurable impact on our symbolic environment. Second, if a particular kind of pollution is deemed to be undesirable, we have to find a way to make it *more* expensive to pollute than to *not* pollute. We can accomplish this in at least three ways.

1. We can prohibit pollution by law and attach stiff fines and perhaps even jail terms for violators of the law.
2. We can use public funds to subsidize either "clean" activities which would otherwise be uneconomic or treatment facilities such as is being done now for municipal sewer treatment plants and secondary sewer systems.
3. We can *internalize* the cost of pollution by having the polluter either pay for treatment or for any damages involved.

The problem of water pollution, like other forms of pollution, is complicated by what I call the "flood phenomenon." For example, the Coliform count of a stream is a good index of the amount of contamination by human and animal fecal material. For many streams, the Coliform count is very high in the early spring because of the flushing impact that snow melt and spring rains have on the watershed. For most stream standards involving Coliform counts, a stream can be "flunked" if a "flood" of Coliform occurs at sampling time and "passed" if a "flood" does not occur. To obtain a good measure of the quality profile of a stream, sampling must either be intensive over time or continuous. Such a sampling technique is both technically difficult and economically expensive. Furthermore, to estimate the impact or "cost" of a short lived "flood" of degradable pollutants is difficult and may not be possible on an operational basis. On the other hand, the average level of contamination by a persistent pollutant like Endrin may be of limited importance when compared to an Endrin "flood" that may last for only a few hours.

Water pollution is a difficult problem. The difficulties are greatly increased because of the "flood" phenomenon. Measurement of pollution is more difficult. If measurement is done well, sampling must either be intensive over time or continuous. Estimation of the impact of deterioration of water quality on both our real and our symbolic environment is immensely complicated by the "flood" characteristic of many pollutants.

The real world is always more complex than we would like it to be. In order to deal with such a world constructively, we deal with a simplified model of the real world. As long as we remember what we have done this is perfectly acceptable and necessary in the case of water pollution and most other phenomena. It is in this spirit of tentative approximation that I would like to end this paper by suggesting some principles I think should be remembered in developing a strategy for water in Montana.

Developing a strategy for water in Montana which will help promote the *best possible* livable environment will be a difficult and continuing job. Such a strategy should recognize at least five elements.

1. Water is a resource that can be used to expand our economic base.
2. Water pollution can have both a measurable impact on things and a symbolic impact upon our image of what we think our environment should be.
3. We must develop an explicit goal which states the kinds of water pollution we will not accept.
4. We must develop and use new methods of measuring both the level and timing of water pollution and the impact that such pollution has on our environment.
5. To achieve this goal, we must develop the legislation needed to convince the potential polluter that it will *cost more* for him *to pollute* than it will cost if he does not pollute.



EVERETT DARLINTON

*Director, Montana
Water Resources Board*

Water and the Environment

EVERETT DARLINTON

Ancient alchemists thought that the basic elements of the universe were air, water, earth, and fire. Why did they reach this conclusion? Simply because each of the so-called "elements" were known to be so important to their lives. Obviously, therefore, ancient peoples recognized that water is vital to life, and since the word "environment" is defined as the surroundings within which man lives, life and the environment would both cease to exist if water became unavailable or unusable.

The importance of water to life cannot be over-emphasized and because of this, citizens of the United States have recently become aroused over the uses of, the need for, and the conservation of water. It is not necessary to recite here in detail the awareness of water's importance which recently overtook the humid eastern states when drought descended upon them, not the desire of the arid southwestern states to obtain water from our Pacific Northwest and/or our Missouri River Basin. Let it merely be said that no one today is playing parlor games with a subject that's as vital as water.

Regarding water as it is associated with man and his environment in Montana, I believe that our State has a bright future for growth and development, depending to a considerable degree, however, upon how wisely we use our water resources. I think that all facets of our economy such as agriculture, municipalities, industries, recreation, and fish and wildlife will require potable (fresh) water in ever increasing quantities, and I do not believe that any single one of these water users should be permitted to appropriate the remaining unused waters in Montana to the exclusion of all the other uses. Furthermore, while I believe that water quality standards in our state should be maintained at the highest level which can be economically attained by agriculture, municipalities, and industries, I do not believe that the standards should be set so high as to drive out any of the most important facets of our economy. For instance, far too much of our economy depends upon both agriculture and industry and I believe this will remain so in the future. Regarding the newest water quality standards which have just been adopted for Montana, I believe that only time will tell, after careful studies have been made in the field as to whether or not some of these standards may be too restrictive and I assume that if they are, they will undoubtedly be revised. However, if they prove feasible, we must continue to demand that they be met by all water users for the sake of maintaining the quality of man's environment as it should and must be.

Two of the ancient alchemists "elements," water and earth, determine very important matters such as: where and what crops will be grown, where rural and urban communities will locate, the types of industries that can survive in a given area, and the types of outdoor recreation which can be supported in the area.

Water can be a great force for either good or evil. We, in Montana, saw too much of water's evil side in June, 1964, when a record snowpack, coupled with an unprecedented rainstorm, caused several dams to breach resulting in the loss of 32 lives and costing approximately \$62 million in damages. Floods are reoccurring disasters which demand earnest attention in order to reduce the havoc they cause. For many years it was thought that the construction of large dams and levies on major streams would eliminate most flood damages but a look at the record shows us that people rapidly move into flood plains when they have reason to believe that they will be protected from future floods. Therefore, large investments in property and businesses which are often highly susceptible to floods are made in protected flood plains. As a result, when large floods occasionally occur, as they surely will, the protective works cannot contain all of the flood waters and the resulting smaller flood often does much more damage than a large flood previously did before the flood plains became heavily occupied. A new approach to this problem is now being widely utilized. Flood plain zoning is being introduced in order to limit the types of structures and businesses which will be allowed in flood plain areas. These will be businesses that by design of their structures, or the type of their enterprise, will not be damaged very much by floods. Flood plain areas in and adjacent to Montana's cities can be zoned under our present city-county planning laws and I believe strong consideration should be given to doing this by local authorities wherever they have flood problems. Montana's communities which desire flood plain studies that will indicate the height to which waters can be expected to rise in floods of 100 and 500 year frequencies, can petition our agency for these studies and we, in turn, request the U. S. Army Corps of Engineers to conduct the studies and they will make these studies as time and money permit. The Corps is limited at present in the money they have for this work but such information as the height of floods is essential if you're going to orderly plan, zone, and develop a flood plain area.

The ancient "elements" air and water are in some respects synonymous since all of the water which falls on the land is, of course, first found in the air. Now that man has discovered how to change his

environment to some degree through weather modification, or cloud seeding, his activities in this field are of growing concern to his fellowman. In fact, this activity may result in the transfer of water from one area to another by means of the air, rather than by conventional streams and canals as we normally think of transferring water. Because of these concerns, our 1967 Legislature charged our agency with the administration of a new Weather Modification Act. To administer this Act, we must screen applicants who wish to conduct cloud-seeding work in Montana as to their educational background in this field and their financial responsibility to carry on the work and assume any resulting damages. We must also issue licenses and permits to qualified concerns after we hold public hearings which indicate that the majority of persons in the area to be affected want the project. Although it was first hoped that this program would become self-supporting because of the license and permit fees which were to be collected by our Board, I do not believe it can do so because research projects may be exempt from the law and most weather modification projects fall into this category, since weather modification is so new. In addition, the Forest Service has informed us that if our Board should decide that any Forest Service projects in weather modification fall under our state law, it does not believe that such operations of the Federal Government can be regulated by a state.

Another very difficult problem with weather modification is that if someone should protest to the Board that he has been damaged as the result of a project, weather scientists inform us that although they are certain they can presently increase precipitation by approximately 10 percent through weather modification, they are not yet able to prove this except in carefully controlled and measured experimental areas. Therefore, in projects conducted along our vast mountain ranges and plains areas it would be extremely difficult to prove that damage had been done by any specific weather modification project. In fact, it may take at least another 10 years before science will have perfected methods of adequately determining this matter. In order to assist us with the administration of this Act, the Board has appointed a small Advisory Council of weather scientists.

Since the condition of our environment should be good enough to allow us to develop the optimum health and well-being of all the people of our State, both now in the future, this means that for all water uses, we must carefully plan for our future water needs. Our 1967 Legislature saw fit to not only change the name of our agency to the Montana Water Resources Board but it considerably expanded our authority to conduct comprehensive, statewide water and related land resource planning. Considerable state funds were made available to us on July 1, 1967 in order to enable us to undertake this important work and we have also received funds from the Federal Government under the matching provisions of Public Law 89-80. Since practically all of Montana lies in either the Missouri or the Columbia River Basins, our agency has participated for a long time in Federal and regional planning conducted, in large part, by the Missouri Basin Interagency Committee, the old Columbia Basin Interagency Committee (now a River Basin Commission), and the Columbia-North Pacific Study. Much of the work done by these committees, which includes a considerable contribution by our Board, as well as by other State and Federal agencies, will be used in our planning effort.

We also intend to use departments of the University System in Montana to develop certain basic models and studies which involve considerable research. For example, we are supporting the Bureau of Business and Economic Research at the University of Montana in Missoula on an economic base study. We are also discussing the possibility of having the Universities' Joint Water Resources Research Center at Montana State University at Bozeman conduct a computerized basins stems model study for application in the later phases of our plan. The purpose of such a project would be to computerize a lot of data and be able to tell what various developments within a river basin might do to its water resources through use of the computer and the answers it would quickly grind out. This is a new undertaking and Doctor Huffman here, of course, is involved deeply with it. We think it can work and we expect the new computer at MSU to certainly help us. In addition, we will rely heavily on the staff of the Montana Bureau of Mines and Geology in Butte, in conjunction with the Water Resources Division of the U. S. Geological Survey, to contribute material on ground water over and above that which we have already gathered in our office. Of course, the U. S. Geological Survey will also furnish data on surface discharge, and the quality, and temperature of Montana's waters.

At present we have developed the barest framework of a "water plan" but I think we have definitely decided upon four phases which form a rational and logical framework. These phases include:

- 1) An inventory phase which will result in detailed knowledge of our water resources and it will involve computerizing of all raw data in a storage and retrieval system which will allow easy and rapid use of data both now and in future phases of the plan.
- 2) A water needs and projections phase the results of which, when balanced against the water inventory, will allow us to recommend developments for the future based upon the availability of

water. Concentration will be centered on the period up to 1980 for which relatively realistic projections can be made. However, we will give some attention to projections for the years 2000, and 2020 even though we can't be very accurate for those dates, but this will keep us in line with other planning now taking place in the West.

- 3) The third phase will involve recommended developments to be accomplished by the target years 1980, 2000, and 2020.
- 4) The fourth phase is an implementation phase. This, of course, is actually doing something with our water resources and this will depend solely upon the wishes of our Governor and our Legislature. Our plans can be no more than a road map, or a guide, for them to follow in deciding how they want to invest funds and what they want done. The plan will have to be continually updated and implemented, and as I mentioned, I do not feel confident about our projections to the year 2020, but as we go along, we will revise and project changes. Who would have guessed, as was mentioned yesterday, the rapid population increase which has come to California, if anyone were trying to project its growth not too many years ago?

During the next year we hope to accomplish the greater part of the inventory phase including cataloging and recording the information by computer and other devices and publishing summaries of the results so that the public, our Governor, our Legislature, and other planners especially, will be aware of our work. Specifically, we will publish a directory and report of the programs of all agencies interested in, or working in, the water resources field in Montana, an up-to-date bibliography of literature on water resources in Montana, a summary of patterns of management and administration of water resources, a summary of economic and legal aspects, a summary of reservoir sites, a summary of surface water data, a summary of ground water data, an inventory of water use, and a history of water planning in Montana. Other subjects to be covered later on will include soils and related land resources and present water needs, as well as a general statement of the water plan and how we intend to formulate it.

Any schedule for completion of our planning goals at this time would be premature. However, a very gross estimate of scheduling is as follows:

Phase I —Water Resources Inventory—1 to 2 years.

Phase II —Water Needs—2 to 3 years.

Phase III—Recommended development (first approximation)—3 to 4 years.

The development and scheduling of the plan is based upon the assumption that other plans, both State and Federal, will be in an approximately similar, or even more advanced stage, in 3 to 4 years and Montana will need a developed plan in about this time in order to coordinate with other agencies and states in a meaningful way. Therefore, as you can see, we are faced with a definite deadline in the perpetuation of our water plan.

Regarding the conservation and wise use of our water resources, I, for one, believe that the construction of many smaller sized, upstream storage reservoirs hold the greatest promise for Montana's future water development. Such reservoirs would catch much of our spring flood waters near their source (and these waters will otherwise surely be lost to us) and the reservoirs would hold waters for use later on in the year by agriculture, industries, municipalities, and recreation, fish and wildlife, when the stored waters would flow by gravity from the high valley reservoirs down through our entire state before reaching our borders. I am convinced that this type of development is very necessary since over one-half of the yearly flow of our streams occurs during just the three months of May, June, and July. In addition to stored waters, detailed studies of Montana's groundwater supplies will show us where the pumping of groundwater may be the most economical, and perhaps the only, source of fresh water available to many areas of our state. Our Board believes that the construction of smaller sized, multi-purpose water projects can be accelerated in Montana through cooperation between our agency, Soil and Water Conservation Districts, the State Soil Conservation Committee, and the Federal Soil Conservation Service under Public Law 566 wherein the Federal Government writes-off considerable sums of money depending upon how much value can be given to flood control, recreation, and other such public benefits which the State does not have a means of funding at this time.

Nearly 8/10 of Montana's land lies in the Missouri River Basin but only 4/10 of our surface water is found there so, conversely only 2/10 of our land lies in the Columbia River Basin but 6/10 of our surface water is there. These facts indicate to me that we should, in the future, consider the possibility of transferring water from our Columbia side to our Missouri side as Montana's water needs increase. Colorado transferred water from her Colorado River Basin to her Missouri Basin a number of years ago and she is presently undertaking further such developments, and as you know, California is transferring considerable water from Northern California to Southern California also. I can only say that with the facts as we have them and with other states having done this, why shouldn't we consider this possibility also?



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Disease in the Environment

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ABSTRACT

The relationship of eight major diseases of livestock and wildlife to environmental health in Montana is discussed. Brucellosis and tuberculosis, once major occupational hazards to livestock and related industries, have been effectively controlled. Q fever, which is widespread among dairy cattle, is potentially a serious hazard to people in rural areas. The organism that causes tularemia is common in ticks and some natural streams; under certain conditions, this disease is a hazard to employees in the sheep raising industry, fur trappers, and people engaged in outdoor recreational activities. Leptospirosis, a serious economic threat to the livestock industry, is a hazard to related occupational groups and persons engaged in water sports. Colorado tick fever, Rocky Mountain spotted fever and arthropod-borne encephalitides are widespread, but only on occasion are serious hazards to vacationers and residents who use the great out-of-doors for recreational purposes.

The ecologic relationships between man and lower animals are reviewed to illustrate how management of animal resources affects environmental health. Measures are proposed for reducing health hazards and improving potential benefits which may be derived from resources in livestock and nature.

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In discussing this topic, Doctor Jutila and I have coordinated our presentations to avoid duplication. Therefore, I will confine my comments to the zoonoses, which are diseases whose causative agents are transmitted from domestic and wild animals to man. According to the latest (1965) census figures, our domestic livestock population consists of 2,869,000 cattle, 1,226,000 sheep, 153,000 swine and 91,000 horses. Hence, the importance of animal diseases to environmental health is related somewhat to population density and distribution in the state.

Throughout the world, man has identified and studied at least 87 zoonotic agents that parasitize man, usually when he intrudes into transmission cycles whereby these organisms are maintained in nature. These include viruses, bacteria, rickettsias, protozoa, fungi, and helminths. However, Montanans are fortunate because many of these diseases have never occurred here, and some which were prevalent during the early history of the livestock industry have been eradicated or controlled by the Livestock Sanitary Board and State Department of Health through well conceived and effective programs.

For the purpose of this conference, I believe it appropriate to consider eight diseases which are present or potential problems. I have excluded salmonellosis which Doctor Jutila will discuss in his presentation on water-borne diseases. Since we are concerned with diseases of livestock, we should consider some of the occupational hazards associated with raising diseased livestock and the processing of animal products for human consumption. This category would include brucellosis, tuberculosis, Q fever, leptospirosis and tularemia. I will also consider some diseases resident in nature which constitute occupational hazards to employees in certain industries and to thousands of tourists and native Montanans who use our great out-of-doors for recreational purposes. In this category I will include Rocky Mountain spotted fever, Colorado tick fever, and the arthropod-borne encephalitides. Tularemia and leptospirosis also are hazards associated with outdoor recreation.

Regulatory officials in Montana should be proud of the progress they have made in eradicating brucellosis, a disease which once was not only a major cause of abortion among cattle and swine, but also was a serious health hazard to ranchers, packing industry employees and the general public. According to information from the State Veterinary Surgeon, the entire state has been classified as a Modified-Certified Brucellosis Area since April 1, 1964. During the past decade, the brucellosis herd infection rate in Montana has dropped 22-fold from 2.36% to 0.11%. At present, only seven herds are quarantined for this disease. A concomitant decrease in human brucellosis has also been observed—since 1963 only one case, a *Brucella suis* infection in Yellowstone County, has been reported.

The Livestock Sanitary Board should be equally proud of its progress in eradicating tuberculosis from cattle in this state. Montana has been classified as a Modified-Certified Accredited Area since December 1, 1935. Last year, only three of 17,485 cattle tested with tuberculin reacted positively. These likely were reactions to acid-fast organisms related to the bovine tubercle bacillus. This disease, like brucellosis, was at one time a serious threat to the livestock industry and to the health of the public who consumed raw milk. Human infection with the bovine type is indeed rare in this country. According to Dr. Arthur Knight, the bovine type has not been isolated from any patient at the Galen hospital since he became director in 1954.

Q fever is one of the more recently recognized zoonoses. The causative organism is a rickettsia which is maintained in a cycle in nature involving various species of small mammals and birds and their arthropod parasites, and by an independent cycle in livestock, chiefly cattle, sheep, and goats. Unlike brucellosis and tuberculosis, infection of livestock with Q fever organism does not cause clinical disease or affect production in any way. Livestock, as well as man, acquires infection by inhalation of the organisms. Animals shed tremendous numbers of Q fever rickettsias in their placentas and lesser quantities in their milk, which serve as major sources of infection for man. Since the organism is unusually resistant, those deposited in the barnyards and feedlots persist for long periods and become airborne in dust created by wind, weather, and man's activities.

In this country the epidemiology of this disease has been studied chiefly in California and Idaho. Because of widespread contamination of the environment in endemic rural areas, the disease was associated with a wide variety of outdoor occupations, but primarily those directly related to the livestock industry. In summary of the epidemiologic picture, three predisposing factors to infection were recognized: 1) residence within $\frac{1}{4}$ mile of infected premises, 2) occupational exposure to livestock or their products, and 3) the household use of raw milk.

Apart from sporadic cases, the disease was first recognized in the United States in 1947 as a serious health problem in California, before any of the broad-spectrum antibiotics were readily available. At that time the disease in man was recognized as a flu-like syndrome complicated with an atypical pneumonia. The severity of illness varied from asymptomatic infection to a severe protracted disease requiring a month or more of hospital care. Although human disease in California was first associated with infected dairy cattle, it soon became apparent that many cases were acquired from infected sheep and goats too. Shortly thereafter, numerous cases appeared among persons occupationally exposed to sheep in south-central Idaho and Texas, and sporadic cases were diagnosed throughout the United States.

Because of the serious nature of the disease in known endemic areas, serologic surveys were made to determine the prevalence and distribution of infection among dairy herds in the United States. In 1949, infection in cattle had been demonstrated in only seven states. By 1959, the organism was shown not only to be present but prevalent among dairy herds in 35 states. In fact, anywhere a search was made, infection was found. In some states over 75% of the herds were infected. In 1959 in Montana, only 1.2% of 5,536 commercial herds tested were infected. Within the next three years the organism had spread to over half of the dairy herds in some counties. A comparable rapidity of spread was seen in Idaho and certain eastern states where similar studies were made.

Despite the rapid spread of Q fever among dairy herds throughout the United States, a concomitant rise in the prevalence of the disease in man did not occur. Through studies conducted in south-central Idaho and in Montana it was shown that infection was prevalent among people living in endemic rural areas, particularly those directly exposed to infected cattle. Among such families, up to 75% had been infected with the Q fever rickettsia and had developed antibodies to the organism. However, from histories of past illness obtained from subjects surveyed, acute clinical Q fever could not be demonstrated. These findings were in sharp contrast to earlier observations in California where the agent caused severe and debilitating disease.

The importance of Q fever as an occupational hazard to the livestock industry today is somewhat difficult to evaluate. We believe that the ability of the Q fever rickettsia to cause disease in man has truly changed. Strains isolated in recent years from dairy cattle are only mildly pathogenic for guinea pigs whereas those recovered earlier from cattle in California cause severe disease in this animal. However, it is also recognized that many febrile illnesses of man treated with broad-spectrum antibiotics may be Q fever, since the disease cannot be diagnosed without laboratory confirmation. Nevertheless, because the organism is widespread and could again become pathogenic for man, Q fever must be considered to be a serious potential hazard to rural residents in Montana.

Leptospirosis came to the forefront several decades ago as one of the leading causes of abortion among livestock. The disease in cattle is still a problem, but it has been partially controlled by extensive vaccination. Leptospirosis in livestock and wild animals is caused by a large variety of serotypes, all of which infect man. The types most commonly found in livestock are *Leptospira pomona*, *L. grippityphosa* and *L. hardjo*. Leptospiras infect man and animals by penetrating mucous membranes or gaining entrance through abrasions in the skin. Animals that recover from the acute phase of infection shed leptospiras in their urine for protracted periods, depending on the host and infecting serotype. Fortunately, leptospiras are fragile organisms and require moisture for survival in the environment. Nevertheless, infected swine and cattle frequently contaminate water in irrigation canals and natural streams and serve as sources of infection for people and animals located downstream.

As an occupational hazard, leptospirosis occurs chiefly among abattoir workers and employees engaged in animal production. A flu-like febrile illness accompanied by meningitis is frequently seen in man infected with *L. pomona*, the most common type in cattle in Montana. Information from a 1965 survey for infection among abattoir workers in Montana suggests that many cases are not diagnosed or reported. Of 317 employees in 23 plants, 14 were found to have antibodies; five of these were hospitalized with a severe illness, but in only one case was leptospirosis considered in a differential diagnosis. Another had been ill with a leptospirosis-like disease but had not been hospitalized.

This disease is a hazard to persons who fish and swim, especially the latter, in natural waters contaminated with urine of infected livestock. Usually outbreaks associated with the favorite swimming hole are not properly diagnosed, unless the attending physician is aware of this hazard. To illustrate the potential danger, I shall refer briefly to two outbreaks reported in the literature. In one of the first recognized, 50 of 80 persons who swam in a contaminated stream in Alabama during a holiday afternoon outing acquired the disease. In another outbreak in Iowa, 40 of 113 persons who swam or waded in a contaminated creek became ill. Signs of meningitis were prominent in affected patients in both outbreaks. Both of these were caused by *L. pomona*, the type of leptospira commonly found in cattle, swine, and many species of wildlife.

While speaking of leptospirosis, I should mention that the urban family dog commonly harbors *L. canicola*, which is also pathogenic for man. About 1/5 of the human cases of leptospirosis in this country are contracted from the family dog. *L. canicola* can cause severe disease and death in dogs, but in many cases it causes only mild or subclinical infections. However, these dogs, as well as those severely affected, will continue to shed leptospires in their urine for protracted periods after the acute phase.

Pasteurella tularensis, the bacterium that causes tularemia, exists in nature as two types, a mildly pathogenic form associated with natural streams, and a highly pathogenic form found in ticks and their rabbit hosts. Both types represent nature's means of controlling populations of rodents, rabbits and other small mammals. When man or domestic animals become infected they usually have intruded into nature's efforts to keep life in proper balance.

This organism is found in *Dermacentor andersoni*, the common wood tick, and in various other species throughout Montana. Domestic animals are relatively resistant, but sheep become ill when they are exposed to inclement weather and a heavy tick infestation. Outbreaks of the disease in sheep usually occur during early spring when they are pastured on a range whose jack-rabbit or rodent population has been recently decimated by a tick-borne outbreak of tularemia.

When I moved to Montana in 1949, it was indeed surprising to learn that some of the crystal clear brooks and streams were continuously contaminated with this organism. Some of these streams have been studied periodically to explain the source and persistence of this contamination, but, as yet, we have no logical explanation. Extracts of mud and leaf mold taken from these streams provide some of the nutrients necessary for growth, but water by itself will not support growth of the organism. Other streams are periodically contaminated when they serve as a medium for the spread of water-borne tularemia among muskrats and beaver. Such outbreaks often occur when large populations of these rodents have accumulated on a stream. Under natural conditions, the outbreaks will continue until the population has been decimated and animals become so scattered that spread of infection is interrupted.

The virulent type of tularemia is chiefly an occupational hazard to persons engaged in raising sheep and related activities. In some areas of the state as high as 24% of employees in the industry have had tularemia. Many cases have occurred among persons attending or autopsying sick sheep. Ticks infected with tularemia deposit their feces in the wool of sheep where the organism remains infectious for a month or more. Hence, tick-infested sheep are a hazard to sheep shearers who often acquire the pulmonary type of tularemia after inhaling the organism. The virulent type is also a hazard to the sportsman who kills infected rabbits and other game. They usually acquire the disease while skinning and dressing game. In Montana, 80% of reported cases acquired their disease from the virulent type involved in the tick-rabbit-sheep complex.

The water-borne type is chiefly a hazard to fur trappers. In a recent survey in Montana, 17% of 344 fur trappers tested by skin test were found to have had previous infection with the organism. Occasionally the disease has been seen in rural families who used water from contaminated streams or whose farm well water supply has become contaminated with seepage from an infectious stream.

Colorado tick fever and Rocky Mountain spotted fever in Montana are both transmitted to man by *D. andersoni*, the common wood tick. The first disease is caused by a virus and the latter by a rickettsia.

Most of you, I'm sure, are familiar with the notoriety spotted fever received during the early history of this state. The prevalence of this disease was so high among sheep herders that they were one of the first occupational groups to volunteer when experimental vaccines became available. Before a vaccine had been developed, it was a particularly serious disease because sheep herders were often in locations remote from medical assistance. This disease is still a hazard to persons in sheep-raising, lumber and other industries who must work continuously in tick-infested environments. However, the annual incidence in this state has declined steadily. We would like to believe that the vaccination of employees in heavily exposed occupational groups has been responsible for this decline. It is likely that employees in these occupations today are more aware of the true hazard involved. We must also consider the probability that many cases are treated early with broad-spectrum antibiotics and are never reported as cases.

Colorado tick fever is caused by a virus also transmitted by the wood tick, *D. andersoni*, the only species of tick known to transmit the disease to man. Accurate information on the incidence of this disease is lacking; however, it occurs more frequently than spotted fever in the Northwest. This disease is also a hazard to persons who work or seek recreation in a tick-infested environment. Fortunately, the disease in man has a low mortality rate, but convalescence is often slow. Though an experimental vaccine has been developed, it is not available commercially.

Of the arthropod-borne viral encephalitides, the most important in this state is the disease caused by Western equine encephalitis virus. This virus resides in nature for about nine months of the year at sites as yet undiscovered. From late June or July until the first killing frost, it passes through populations of young domestic and wild birds that had not been infected the preceding year. It is transmitted from bird to bird by various species of mosquitoes, chiefly those of the genus *Culex*. When the vector potential is great and other conditions are proper, transmission to man and horses occurs. Infections in both of these are dead-end cycles and will not result in further spread of the virus. Sporadic cases occur almost every summer and occasionally serious epidemics have occurred. Though man has no control over factors such as weather and rainfall, changes in mosquito habitat he has created by faulty irrigation practices have often resulted in a high vector potential. Accumulation of waste water and seepage often provide added breeding grounds for mosquitos that transmit this virus to man.

Though I have discussed only eight diseases which are environmental hazards related to animals in nature and the raising of livestock, I could mention many others such as psittacosis, listeriosis, rabies and anthrax, that sporadically present problems to health officials in this state. According to current trends in animal production, we can anticipate larger herds and greater concentrations of animals in more limited space. Under these conditions the control of zoonoses and other animal diseases becomes even more important in the interest of public health and agricultural economy. I referred to two diseases, brucellosis and tuberculosis, which have almost been eradicated by vaccination and/or test-and-slaughter program. At this point, it would be easy to become complacent and reduce government expenditures to control these diseases. However, without constant reduction in the size of the disease reservoir and control over the movement of infected cattle, these diseases would soon become major problems again. Some taxpayers have been critical of the money spent on meat inspection and milk sanitation programs, and others have questioned whether these programs are essential to public health. Not enough of the public fully appreciate the value of an inspection stamp on an animal product, which in essence certifies that the product is wholesome and free of animal diseases.

Leptospirosis is difficult to control because the number of immunologically unrelated serotypes that cause disease in animals and man. Vaccination or infection with one serotype does not provide protection against another. Control among livestock is also complicated because many species of wildlife harbor the same serotypes that affect cattle and swine. At present, vaccines prepared from *L. pomona*, *L. canicola* and *L. icterohaemorrhagiae* are available, and their use in appropriate situations is recommended.

There is an urgent need for more effective county zoning laws which would apply to livestock and related industries. With increasing populations of livestock anticipated it becomes important to monitor the role of livestock on stream and air pollution. Feedlot operations should not be situated on or near streams which may be polluted with urine and excreta containing such pathogens as *Salmonella* and *Lep-tospira*. Feedlots and overgrazed rangeland are often the source of topsoil that silts our streams. How many of our abattoirs and creameries are discharging wastes into our streams without proper sewage treatment? Some feedlot operations, particularly those using beet pulp for feed, and abattoirs are the source of offensive odors that permeate the atmosphere. Why should these be located near urban populations whose members are forced to live in such an environment? Every time I pass through a certain town in central Montana I wonder what special advantages compensate sufficiently for the offensive odor to keep its residents there.

The ecology of most zoonotic agents in nature is so complex that their eradication is impossible. In some instances man has attempted to control a disease by poisoning a specific host or vector, but the resulting disturbance in ecology created even greater problems. It is more important to recognize and understand the problem so that reasonable precautions are taken. In the case of Rocky Mountain spotted fever and Colorado tick fever, the person who must work or chooses to seek recreation in a tick-infested environment should wear protective clothing and make at least a daily search for ticks he may have acquired. Persons repeatedly exposed to Rocky Mountain spotted fever should be vaccinated annually. Where tularemia occurs in sheep, attendants should wear protective gloves when handling or treating sheep. Men shearing tick-infested sheep should wear masks, but I doubt that many could be induced to do so. The control of Western equine encephalitis is most difficult. During seasons and times when the vector potential is high, people in rural areas should use repellants to avoid exposure to *Culex tarsals*, the major vector of Western equine encephalitis. Reduction of mosquito populations by aerial spraying of insecticides has been used with variable success to suppress epidemics.

In conclusion, I should emphasize the importance of animal health on human health. Biologically, man is so closely related to lower animals he also falls victim to many parasites of his domestic counterparts. The livestock industry should plan its development and progress with appropriate respect and consideration for all members of the community in which it prospers.



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Diseases of Man In A Polluted Environment

John W. Jutila, Ph.D.

ABSTRACT

The pollution or alteration of our environment has increased the incidence of certain diseases of man particularly in densely populated and industrialized areas. Air pollution appears to predispose to chronic upper respiratory tract diseases including bronchitis, asthma, emphysema and infections. Studies in animals experiencing prolonged exposure to smog have revealed an increased incidence of lung cancer. Statistical studies relating to the incidence of lung cancer in humans residing in air-polluted communities also indicate a casual relationship between air pollution and lung cancer.

The most disastrous consequence of dumping wastes into a stream is the threat to public health. Water receiving untreated sewage serves as a reservoir for enteric infections produced by Shigella and Salmonella organisms and infectious hepatitis virus.

Although the excessive use of many pesticides has not been shown to represent a public health hazard, studies on humans have not been sufficiently extensive to predict the long-term effects on human health.

Irradiation of various types from sources frequently encountered by the public have been shown to produce serious diseases in both young and old. Typically, bone cancer and leukemias are the unfortunate sequelae of excessive exposure to X-irradiation.

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The experience of health implies fitness both of man and his total environment and even simple survival depends on definite environmental conditions. Man, by manipulating his internal and external environment with the tools of his technology, has evolved intellectually and spiritually beyond the point of simple survival and he anticipates a more creative, productive and pleasurable life than his antecedents. Paradoxically, with his technology, man has produced deleterious changes in his environment which seriously impair the health of man and may eventually destroy man himself. Hence, it appears that if man is to lead a productive life or even to survive, he must achieve and maintain a good environment, a necessary prerequisite to good health.

To accomplish this, he must develop working concepts, formulated on information gained through research, on which to base activities for the promotion of health in his environment. These concepts should consider, of course, all the dimensions of man's needs in the total environment which consists of four levels of ecologic organization, namely, 1) the physiochemical level describing man's physical and chemical properties, 2) the biologic level describing the life-giving properties of the external environment, 3) the social level describing the interaction of man with man, and 4) the individual level which describes man's psyche. Each system or level interacts with and relates intimately to all of the others, hence each by itself cannot be considered or studied independently. My discussion today, however, attempts to define those alterations of the physiochemical environment of man termed disease, which are produced by marked changes in the biologic environment. At the same time, I will address myself, where appropriate, to those deleterious factors in our environment that contribute to human disease.

Although a marked alteration of the human bio-environment has not yet occurred in Montana, one need only look to the effects of air, water and terrestrial pollution in more densely populated and industrialized areas of the world to appreciate its impact on human health. A vast literature documents the adverse affects of pollution of our environment on human health particularly in the last two decades.

Urban air pollutants consist of a varying mixture of particulate matter and many gasses and vapors, the quantitative and qualitative composition of which varies from place to place and time to time. Much data is available on the concentration of these pollutants in city air, both in this country and in foreign countries; despite this, little is known concerning the levels of pollutants hazardous to the health of city dwellers. In addition to particulate matter such as carbon, tars, oils, dust, lead, etc., there are a host of irritants, oxidants and systematic poisons present in polluted air too numerous to list here having an effect on human life. (See Table II.) Moreover, in appraising the effects of pollution on human health and predicting those communities in the state which have or may have pollution problems, it is important to consider the meteorologic phenomena (wind direction, temperature, humidity, inversions) as well as the type and origin of pollutant. More has been and will be said about this matter by other speakers in the symposium.

Studies on patients with severe symptomatic chronic obstructive pulmonary disease (emphysema) exposed to smoggy Los Angeles or New York air have shown that such smog produces severe impairment of lung function. Hoarseness, increased cough, shortness of breath, nausea, vomiting and irritation of mucous membranes of eyes, nasal passages, the pharynx and bronchial tree were the most common symptoms observed in the study subjects. These studies have also revealed an increase in airway resistance, oxygen consumption and a lowering of oxygen levels in the blood. The latter finding suggests a decreased ability of the lung to metabolize oxygen. Air pollution has been definitely associated with an increase in mortality from chronic pulmonary diseases particularly in the 45 to 64 year old age group. The 1952 air pollution disaster of London, for example, recorded 4,000 deaths which could be attributed directly to air pollution.

Animals exposed to Los Angeles smog over a prolonged period developed similar chronic respiratory diseases as seen in the human. Significantly, this seemed to predispose to an increased susceptibility to bacterial and viral infections, an increased incidence of lung cancer, and, in some cases, death. Although definite data on an increased incidence of infection and cancer in humans exposed to polluted air is lacking, statistical evidence seems to indicate a good relationship between air pollution, lung cancer and respiratory infections in urban areas. A recapitulation of the effects of air pollution on human health appears in Table III. It has also been shown that as the air pollution levels increase, a greater response can be elicited from human study subjects. Conversely, as the pollution levels are lowered, the symptoms decrease. In general, subjects with a history of respiratory disease or those who smoked were more severely affected. Because of their location, meteorologic conditions and growing population and industry, several cities in Montana now or will have in the very near future acute air pollution problems. Among these are Missoula and Billings with their combination of industry, inversion phenomenon and growing populations contributing to a growing air pollution problem. Other communities have experienced low but detectable levels of air pollution which seem to subtly but adversely affect different life forms. Some data obtained by Dr. Eugene Sharp at Montana State University (see Figure 1) indicates that large numbers of particles with adherent gases accumulate in the atmosphere during heavy traffic on campus. This data was obtained one evening before and after a basketball game on campus and reflects in a dramatic way the rapid accumulation of air-borne pollutants which have been shown to possess potent biological effects on host-parasite systems currently under study at M.S.U.

The most disastrous and immediate consequence of dumping wastes into a stream, river or lake is the threat to public health. Communities located downstream from where raw sewage and wastes enter are menaced by possible outbreaks of water-borne diseases that could reach epidemic proportions.

The health of the stream itself, as indicated by aquatic life, is also affected by indiscriminate waste practices. Biologically speaking, a normal stream supports a teeming population of micro-organisms, plants and animals dependent upon each other for food and upon the stream for oxygen. When an extra load of organic impurities such as sewage and industrial wastes stimulates microbial growth, the supply of dissolved oxygen is quickly exhausted. In extreme cases, recovery does not take place, vegetation and fish are destroyed and the polluted stream becomes an open sewer with its concomitant stenches and disagreeable appearance spoiling the economic and esthetic value of the stream and its environs.

Such changes not only make the water unusable for animal and marine life but may produce toxic and sometimes fatal reactions in humans following consumption. The pollution of water with human or animal wastes commonly contaminates the stream with pathogenic bacteria or viruses, (Table IV), the former even proliferating in enriched waters. Bacteria of the *Salmonella* and *Shigella* groups are commonly found in fecal material from man and animals and such organisms can be isolated from many rivers and streams in the U. S. The consumption of water contaminated with *Salmonella typhosa* or paratyphoid organisms can lead to the development of typhoid fever with a mortality rate as high as 20% in untreated cases. The ingestion of water contaminated with *Shigella* organisms commonly results in epidemics of Shigellosis or more appropriately, bacillary dysentery.

The virus disease termed Infectious Hepatitis can be contracted from polluted water or by eating shellfish or other marine forms harvested near the mouths of polluted rivers. Infectious hepatitis occurs under natural conditions and epidemics are seen most frequently under conditions of communal living such as schools, summer camps and institutions. Sharp, explosive out-breaks are particularly common such as those originating from a single source as drinking water.

The pollution of soil and plants with toxic compounds has led to speculation that chronic diseases following ingestion of dust, soil, plant and animal products may lead to chronic diseases in man. Foremost among these toxic compounds are the pesticides employed for insect control in commercial plants pro-

duction. The indiscriminate use of chlorinated hydrocarbon pesticides including DDT, chlordane, dieldrin, lindane and endrin has provoked the wrath of naturalist and ecologist alike because of the destruction of natural communities, and health scientists themselves are convinced that man's health over a long period of time will be impaired by continuous ingestion or absorption of minute amounts of these compounds. It is true that for each commercially available pesticide, long-term experiments have been performed in rats, dogs and other animals. Such experiments in rats have included study of the progeny for three generations. Similar feeding experiments have been carried out in dogs for periods as long as two years. Recently, a team of Chicago investigators assayed 944 specimens of human abdominal wall fat for a variety of pesticides (mostly organochlorine pesticides such as DDT). As found in previous studies, the principal pesticide was DDT, 72.2% of which was in the form of its more innocuous derivative, DDE. Lindane, dieldrin and heptachlorepoxyde were found in varying concentrations in some but not all fat tissue examined. A very significant observation was that there was no evidence of progression of storage of DDT products in the general population since 1951. A statistical survey of the pathological changes in the tissues examined in 668 autopsies showed that there was no significant correlation between the levels of insecticides in the fat and the presence or absence of abnormalities in these tissues.

Yet in spite of the fact that no effects have been seen in short term studies in humans and in three generations of rats with daily doses many times that which humans are constantly subjected, there is still doubt that the results can be extrapolated to a whole lifetime exposure in man. Some published evidence demonstrates that these chemicals may alter some physiological activities of cells which may give, in turn, rise to chronic diseases later in the life of adult humans. It is entirely conceivable that certain types of human cancer develop from chronic exposure to these toxic residues. The increased quantities of irradiation in different forms are now being recognized as potential health hazards. For example, microwave ovens are gaining popularity in foodservice facilities and in self-service, food-vending establishments. Such units may be found in recreational places such as bowling lanes, cafeterias and superhighway rest stations. The health hazard associated with exposure to microwave radiation has been recognized for some time. The biological effects of exposure to microwave radiation result primarily from the heating of body tissues, and depend in general on the frequency of the radiation, the intensity of the beam, length of exposure and thermal conductance of the tissue. Cataracts of the eye have been frequently encountered in individuals exposed to moderate doses of microwave irradiation. A recent study conducted by Surovec in Pennsylvania was shown that 16% of the microwave ovens monitored released radiation levels of 10 milliwatts per square centimeter or above. This equals or exceeds the criterion for exposure to microwave irradiation considered potentially hazardous by the Bell Laboratories. Other forms of irradiation as from TV sets have also been shown to produce symptoms of eye damage. Excessive use of X-ray in clinics and hospitals appears to predispose to the development of human diseases particularly bone cancer and leukemia. Pelvimetry of pregnant mothers should be discouraged to avoid irradiation of the fetus, a factor which appears to increase the incidence of leukemias in young children.

Since conventional diseases of the human such as diphtheria, smallpox, polio, whooping cough and the like have been effectively eradicated by our technological advances, we find the health standards of the U. S. and other parts of the world are reaching higher plateaus each decade. The solutions to major health problems of today, however, including cancer, cardiovascular disorders and low grade and chronic infections will not come about, I am convinced, until the quality of our environment improves. The chronic insult of noxious air, contaminated water and food will continue to harm or destroy tissue or alter its metabolism inevitably leading to disease. Man may develop methodologies to repair or replace tissues and organs as they become damaged, but the persistence of deleterious environmental factors will continue to insult the body and create disease. One can only conclude from an abundant literature relating to the impairment of human health by a polluted environment that the experience of health *demands* fitness both of man and his total environment.

TABLE I
Different Levels of Man's Ecologic Organization*

Ecologic level	Supplies	Programmed by
PHYSIOCHEMICAL	DNA, RNA, HORMONES, ENZYMES	GENES
BIOLOGIC	O ₂ , FOOD, WATER, AIR	INSTINCTS
SOCIAL	SAFETY, WORK, SECURITY, LOVE	SOCIETY
INDIVIDUAL	IDENTITY, SELF-ESTEEM, MEANING	SELF-REFLECTION

* A modification of Hoke's (Arch. Environ. Health 16: 269) man-whole concept.

TABLE II
Classification of Air Pollutants Detrimental to Human Health

PARTICULATE MATTER:	CARBON PARTICLES, TARS, OILS, MINERAL FUMES, DUST, LEAD, ORGANIC DEBRIS
IRRITANTS:	DUST, HYDROCARBONS, ACIDIC MISTS, VAPORS AND GASES, eg. SO ₂ , H ₂ SO ₄
OXIDANTS:	GASES, eg. SULFUR AND NITROGEN OXIDES (SO ₂ , NO ₂) and OZONE
SYSTEMIC POISONS:	CARBON MONOXIDE, HYDROGEN SULFIDE, CYANIDE, NICOTINE, ECONOMIC POISONS, eg. FLUORPHOSPHATES, CHLORPHENO- THANE

TABLE III

Diseases of the Human Predisposed to by Polluted Air

SYMPTOMS OF UPPER RESPIRATORY TRACT DISTRESS

- A. Coughing
- B. Wheezing
- C. Nasal discharge
- D. Hoarseness
- E. Shortness of breath

ASTHMA, BRONCHITIS AND EMPHYSEMA

UPPER RESPIRATORY TRACT INFECTIONS

LUNG CANCER

CARDIOVASCULAR DISORDERS

MORTALITY FROM HEART ATTACKS

TABLE IV

Diseases of the Human Contracted
from Polluted Water

ACUTE TOXICITY

GASTROENTERITIS

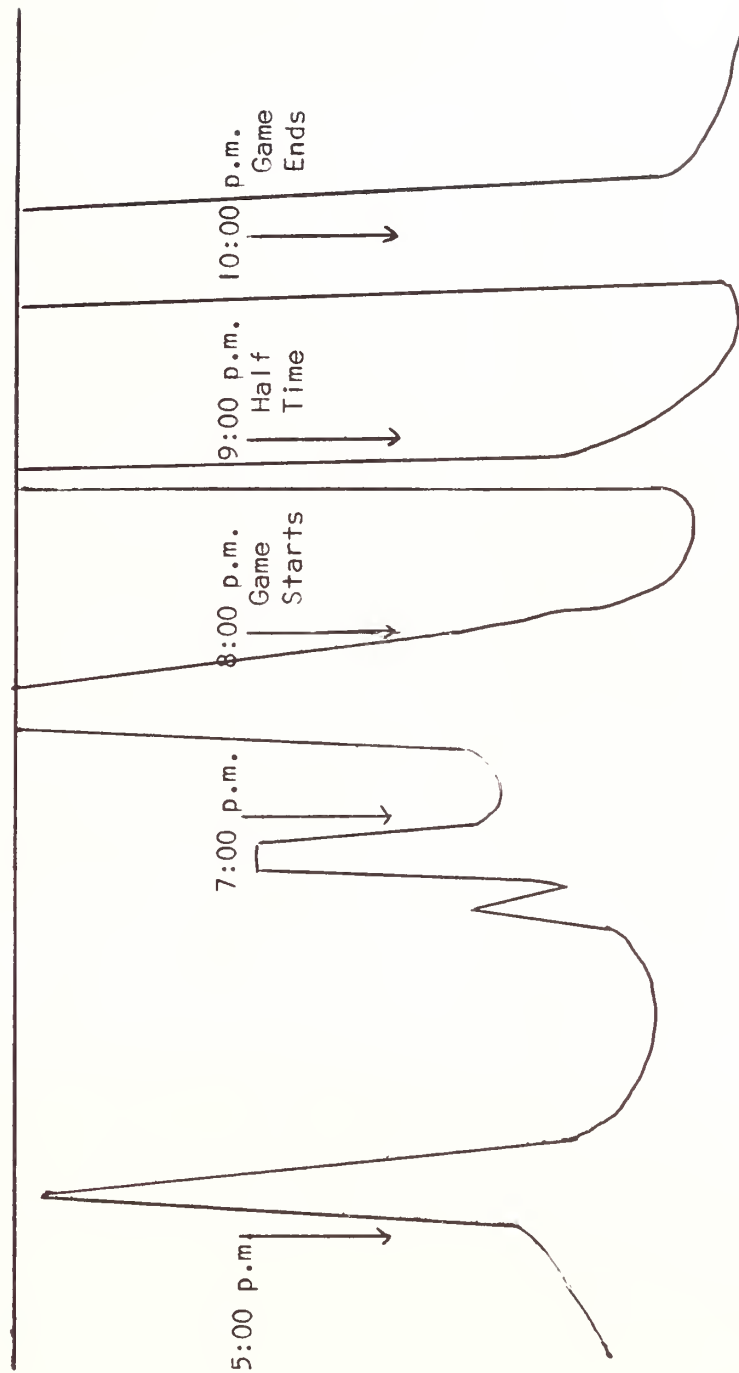
TYPHOID FEVER

BACILLARY DYSENTERY

INFECTIOUS HEPATITIS

FIGURE 1

LEVEL OF LARGE IONS IN THE AIR AT MSU DURING HEAVY EVENING TRAFFIC





RICHARD C. SETTERSTROM

*Area Development Manager
Montana Power Company*

Recreation vs. Industry For Montana

Richard C. Setterstrom

A man was babysitting his six-year-old son on a rainy Saturday afternoon. To keep the boy occupied, he gave him a jigsaw puzzle. It was a map of Montana cut up on county lines. He thought the boy would have quite a time putting it together. In a short time the boy came in and said, "Daddy, I'm finished."

The father went to the kitchen to see and sure enough it was finished but differently than had been expected. The boy discovered the picture of a man on the reverse side. He knew what a man looked like and quickly assembled the puzzle.

As we have learned the past two days, the development of Montana is very complex and very much like a jigsaw puzzle. However, if we keep the picture of a man uppermost in our mind, we will accomplish a good job of development.

I have been working full time on the economic development of Montana for the past 28 years. During that time I have developed some goals that I would like to see achieved.

1. Steady employment.
2. Wise use and conservation of our natural resources.
3. Planning and zoning.
4. Community improvement.
5. High quality education.
6. High quality recreation.
7. Develop in people greater pride in their communities and in Montana.

Steady employment produces the income which permits people to enjoy a good life. It creates a feeling of stability in a community which leads to the building of good schools, churches, hospitals, recreation and cultural facilities and to a progressive looking "Main Street."

Basic industries are the foundation of steady employment. Without basic industries, and this includes agriculture and recreation, a community cannot exist. According to the current issue of *Dude Rancher*, Elkhorn, Montana, near Boulder, once had a population of about 3,000.

Quoting from the magazine—

"Unlike most of the early camps, Elkhorn occupied a beautiful setting. And as one stands in the center of town he might raise his eyes to the surrounding, forest-clad mountain slopes, expand his chest with lungs full of clean air and allow his mind to go back a hundred years to a time before Peter Wys followed the little mountain stream into this gulch and made his strike."

Sounds like a wonderful place to live. Unfortunately, because there is very limited mining in the area, only two or three families of about a dozen people are able to live there.

How many of you are wearing a suit or dress which was made in Montana? How many of you drove a Montana made automobile to Helena? How much of the materials in your home were made in Montana? How much of the food that you eat was raised or processed in Montana?

You will agree that very few of the products that you use in your daily lives were produced in Montana. To get these products from other states or countries, we must have dollars to send out to buy these commodities.

Where do we get these dollars? I can assure you they do not come from circulating dollars in Montana by taking in each other's washing. We must send products out of Montana for which we receive dollars. These are the dollars which permit us to buy products from other states and countries.

Approximately \$400 million worth of agricultural products leaves Montana annually to bring in dollars. About \$100 million comes in from the ores mined in Butte. The nine-month strike means that the people of Montana will have about \$75 million less to spend on products and this will show up in many places during the next few years. Forest products bring back about \$100 million. The operation of the three oil refineries in the Billings area adds about \$50 million a year. Outside tourist and recreation dollars are also in this category.

The Montana economy is changing and I have some charts to quickly show what is happening.

From 1930 to 1966, we dropped from 18,400 jobs in mining down to 7,400. Now this will be even lower because we anticipate a further drop of 1,000 jobs in Butte. Agriculture dropped from 82,600 to 34,000. We don't expect this to come back up because of continued automation and larger ranches; it is going to continue to drop. In manufacturing we went from 13,400 to 26,000. This is one of the places where we have been able to keep our economy going to pay for the many services which we demand as citizens today, such as better education. Our total number of farms dropped from 47,500 to 27,000 and we certainly aren't going to reverse that.

<u>Trends of Basic Industries</u>				
<u>Year</u>	<u>Employment in 1000's</u>			<u>No. of Farms</u>
	<u>Mining</u>	<u>Agriculture</u>	<u>Mfg.</u>	
1930	18.4	82.6	13.4	47.5
1940	13.8	59.8	13.7	41.8
1950	11.8	53.1	18.5	35.1
1960	7.4	39.0	23.4	28.0
1966	7.4	34.0	26.0	27.0

Let's take a look and see what happened to our population during the period from 1930 to 1960. In the first column are the number of manufacturing industries in these different counties. Golden Valley, which does not have a single manufacturer, had a drop in population of 43 percent; Carter with one, 40 percent; Garfield, 54 percent drop; and Stillwater, 12 percent. In the counties where the number of industries increases, the population begins to increase. The one exception is Silver Bow County which has a drop of 19 percent because of the drop in the mining employment. The population growth of Yellowstone County was 157 percent. This increase is due to an increase of industrial jobs.

<u>County Population Trends - Effects of Industry</u>				
<u>County</u>	<u>No. of Mfg Ind.</u>	<u>Population</u>		<u>% Change</u>
		<u>1930</u>	<u>1960</u>	
Golden Valley	0	2126	1203	-43
Carter	1	4136	2493	-40
Garfield	1	4252	1981	-54
Stillwater	9	6253	5526	-12
Fergus	16	16531	14018	-15
Sanders	35	5692	6880	21
Lewis & Clark	45	18224	28000	54
Silver Bow	45	56969	46454	-19
Gallatin	53	16124	26045	62
Cascade	62	41146	73418	78
Missoula	92	21782	44663	105
Yellowstone	101	30785	79016	157
Flathead	124	19200	32495	69

The next chart is a tabulation of data from the Upper Midwest Research and Development Council. It shows the change in the number of people employed from 1960 to 1965.

Montana Employment					
Category	1960	1965	%Change	1975	%Change
Mining and Metals	8200	7908	-4	7715	-3
Fuels and Oil	3234	2996	-7	3107	+4
Food and Grain	4633	4692	+1	4648	-1
Lumber and Paper	8176	9635	+18	10548	+11
Other Industries	5344	6130	+15	6725	+10
Total Basic Industries	29587	31361	+6	32743	+4
Utilities and Transp.	19855	18453	-7	17160	-7
Construction	14689	15762	+7	17335	+10
Commercial	92132	96399	+5	108305	+12
Government	38600	46254	+20	60352	+30
Total Non-Ag	194863	208229	+7	235885	+13
Agriculture	39000	35200	-10	27400	-22
Total Employ.	233863	243429	+4	263295	+8
Total Less Govt.	195263	197175	+1	202943	+3
% Govt. to Private	19.8%	23.5%		29.7%	

In mining and metals we went down four percent. The Council also makes a projection for 1975. These are what we call neutral projections. If we just sit here and do nothing, this is probably what is going to happen. It anticipates a further reduction of three percent in mining and metals by 1975. I believe this might be greater except that the price of gold or silver could bring back some mining activity. Fuel and oil went down seven percent. This is due to automation and also reduced activity. The projection for 1975 is up four percent. Food and grain products had a one percent increase with a one percent decrease by 1975. Lumber and paper is one of the bright spots where we had an 18 percent increase in the five-year period and anticipate about 11 percent increase in the next 10 years. Other industries is another bright spot where we've had a 15 percent increase with a 10 percent increase anticipated by 1975. For the total basic industries, we've only gained six percent in the five-year period with an anticipated gain of four percent for the next 10 years.

Utilities and transportation lost seven percent in the five-year period and an expected loss of seven percent for the next 10-year period. Construction had a 10 percent gain with a gain of ten percent by 1975. Commercial, and this is where our tourist business is shown because these are the services that we sell to the tourist, had a five percent increase with 12 percent increase by 1975. In government we had a 20 percent increase in employment in this period and we anticipate a 30 percent increase by 1975. We want more services, we want better schools, we want all these things so we must expect an increase in the government employment.

The total nonagricultural employment resulted in a 7 percent increase with 13 percent anticipated. Agriculture had a 10 percent decrease with another 22 percent drop projected. For total employment we wind up with a 4 percent gain and an 8 percent anticipated increase. The total less government is only a one percent increase in the five-year period with only a 3 percent anticipated increase for the next 10 years. This is again a neutral projection—if we just sit here and do nothing.

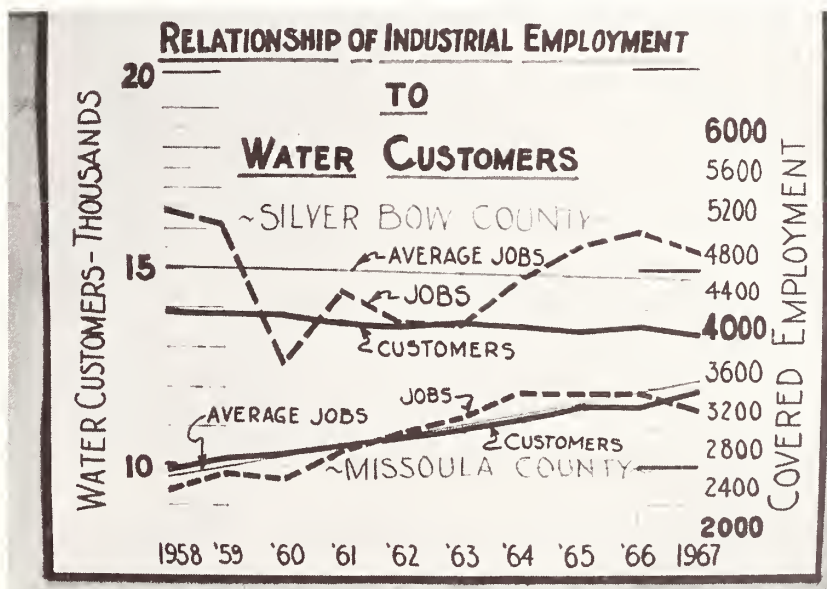
The ratio of government to private employment in 1960 was just about 1 out of 5, in 1965 it was 23 out of 100 and it is anticipated that by 1975 it will be just about 30 out of 100 employees. This represents taxes that we've got to raise some way and we've all heard plenty about taxes recently.

Let's take a look at a profile of Montana manufacturers. Almost half of our total of 963 manufacturers employ 3 or less employees, but that represents only 2.4 percent of the total employment. With effort we can build these small industries up into something that could be really worthwhile. On the other hand, half of the employment in industry in Montana is by the 23 largest companies. That gives you a brief picture of the changing economy. (See picture on next page.)

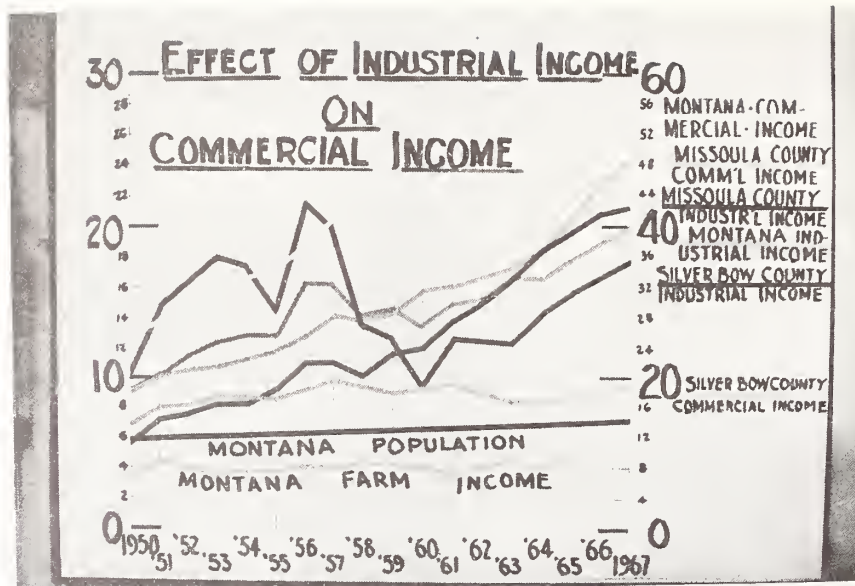
Let's take a look and see what happens when industry goes up or down in a county. I picked out two counties, Silver Bow and Missoula because one has been going down, the other has been going up. This dotted line represents the number of jobs in mining and manufacturing employment. The yoyo effect is due to strikes, but the general trend is down. This line represents the number of water custom-

Profile of Montana Manufacturers ^{March 1967}				
Employees	Employers	% of Total	Total Employment	% of Total
0-3	458	47.6	543	2.4
4-9	221	70.5	1316	8.4
10-19	119	82.9	1536	15.3
20-49	91	92.3	2817	28.0
50-99	32	95.6	2245	38.1
100-249	19	97.6	2869	51.0
250-499	15	99.2	4761	72.1
500-999	7	99.9	4914	94.2
1000 & Over	1	100.0	1282	100.0
Total	963		22193	

ers and the trend is downward. In Missoula County, we've had a build up of jobs because of the pulp and paper mill which has been basic to the growth of the forest products industry. The number of water customers is also up. The more people you have in a town, the greater is the potential business on main street.



Let's take a look, dollar wise, for the same counties. The green line represents the industrial income or wages to mining and manufacturing employment for Silver Bow County. Again you notice the yoyo effect, caused by strikes, but the trend has been downward. The broken green line represents the employment income up and down main street. You see that it has been about flat. If we take inflation into consideration, it actually means we've lost ground. In Missoula County, which is the blue line, our trend has been up in industry and by the same token, it's been up in the commercial field. The orange line is for the State of Montana and again you can see the effects of the strike on the total Montana income in industry and mining. The trend has been up because of the build up of manufacturing. This line represents the total commercial income and it also has been up.



This yellow line represents the farm income. Over the 18-year period it is just about level. Considering the devaluation of the dollar, it's actually been losing ground at a pretty rapid rate. The Montana population is actual for 1950 and 1960 and is projected beyond that. You will note that it is pretty flat.

Now let's get back to some of the other objectives, the wise use and conservation of our natural resources. The Montana farmers and ranchers have contributed much to the livable environment for the people of Montana. In 1967, the farmers and ranchers spent \$12,000,000 for conservation practices. This is double of what it was three years earlier. This has been done through the Soil and Water Conservation Districts with the help of the ASC, SCS, Extension and many other agencies. This conservation has helped the farmer and ranchers to stay in business during these very critical times. It has benefitted the urban population and has conserved our natural resources for future generations. During the past 20 years, the range capacity in Montana has been increased by about 20 percent. Experts in this field feel that this is just the beginning because only half of our range is in good to excellent condition. Good range means that we are going to have a beautiful grass countryside instead of barren desolate looking country. Good range use reduces erosion which means clear trout streams with better fishing and also better grazing for our wild game. Ave Linford, State Conservationist, has estimated that 65 percent of all the forage for wild game comes from private land.

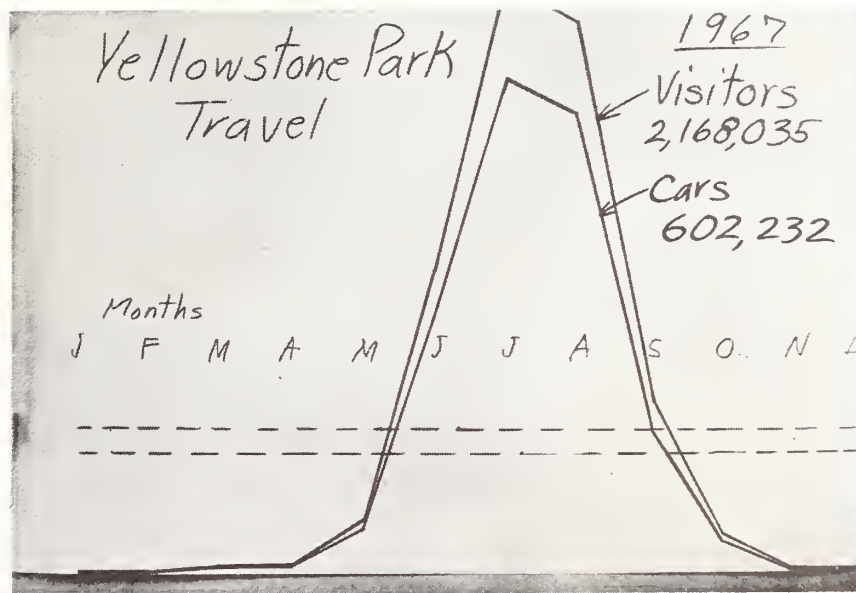
Twelve years ago, one-third of the tree was beneficially used. About one-third was left in the forest and about one-third was brought out and burned at the mill sites. Today, because we have a pulp and paper industry, about 70 percent of the tree is used. And furthermore, this material that was previously burned is now converted into pulp and paper, which is sent out of Montana to bring \$30,000,000 a year back into Montana to help us have this better life in Montana. It would require about 15 big teepee burners to burn the material used by the paper mill.

More jobs and more industry to me are meaningless unless it contributes to a better living environment for our people. So, by planning and zoning, which we have heard about today, we can achieve a better living for our people.

Relative to community improvement, former Governor J. Hugo Aronson made a very substantial contribution to the Montana Chamber of Commerce for a community betterment program. It is in its third year now and it is very encouraging to see what some of the communities have accomplished through this program.

We need high quality education to meet the changing needs of this world. We must educate our children so they can meet the ever rising standards. We need more good Vo-Tech education in order to take care of those boys and girls who do not go to college.

We certainly want high quality recreation because we have this available to us if we will plan and do those things that will maintain it for us.



However, recreation alone cannot provide a good economic base for Montana. Here is what the travel in Yellowstone Park looks like on a month-to-month basis.

For the early months of the year until you get into June, you have very little travel. Then, you have this big peak for two to three months and then it goes down again. The average is very low and the peak is very high so recreation alone will not keep Montana economically healthy. As long as school vacations are in the summer, we may expect this travel pattern.

The last thing I would like to emphasize is let's work to develop in people a greater pride in their community and in Montana. I spent a few minutes Sunday picking up some of the rubbish along just one-fourth of a mile of the deadend road into our ranch. I miscalculated because I only took one sack along. I picked up this sack full along the road which accumulated in just the last three months. We try to pick it up as it is dropped, but due to other problems we haven't been able to do it this year. This problem could be eliminated without cost if people were thoughtful. I don't think we want to invite people from all over the country to come out and see this. We have traveled extensively with a trailer to New York, California and elsewhere and unfortunately from our observation, Montana has more junk scattered along its highways than any other state in which we've traveled. One time I counted the cans along the highway between Havre and Chester and it averaged about 4,000 cans per mile. Folks, let's try to work together to achieve these goals and to try to make a better Montana.



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Recreation vs. Industry For Montana

Charles C. Bradley, Ph.D.

ABSTRACT

A resolution of the conflict between outdoor recreation and industry in Montana calls for a State zoning ordinance.

* * * * *

The title for discussion by this panel, "Recreation vs. Industry," implies a conflict between these two, a conflict needing some kind of resolution. I suppose if we are going to have an orderly discussion we have to agree first, that a conflict does, in truth, exist; and second, what is the nature of the conflict, and then the resolution, if any, would presuppose various preliminary steps. Almost certainly, a resolution would have to be preceded by a decision to make some choices. This in turn, would suggest that before we'd arrive at a system of alternatives and priorities and you cannot develop these without an agreement on values, and here is the tough nut to crack! People in many group meetings come in all sizes, shapes and predelictions. Even when we probe right down to bedrock, we have quite a job arriving at any common value system, so, in the end all of us live in a constant state of exasperation at the way the other guy's activities mess up our lives.

Let me start then, I'm going to say that conflict does exist between recreation and industry and I'll try to outline where I think it will lie. Then, I will make a suggestion or two before it's through as to how we might resolve it; in fact, I'm going to come up with a specific resolution, then you've got something hard to discuss. Well, I hope, even if we don't have a discussion here, we will have some idea of what to discuss after we are through, amongst ourselves. Since I am an ardent outdoor recreationist, I'm going to let Dick take care of himself. I'm not going to protect them at all. In fact, they show signs of not needing and perhaps not even wanting my help.

I'm going to limit the term "recreation" here because I think the way it's used in the title suggests a limitation is in order. I'm going to limit it to *outdoor* recreation. This will narrow the zone of conflict if there is one and then, because I don't really want to include such outdoor recreation in my discussion as tennis, swimming pools, starlight theatres, and this type of thing, not even outdoor poker games and fraternity "keggers," or some of the other things that might classify under outdoor recreation. I'm going to limit this down to *that type of outdoor recreation which capitalizes on the natural or semi-primitive lands of Montana*. I do this partly because I believe that is what is wanted and partly because this is where the conflict comes if there is a conflict. The conflict, as I see it, is in competition for the natural resources: land, air, water, and biota.

First, I would like to have it clear that I was going to point out an example of asymmetrical conflict in this room because I thought it probably would exist but is not severe enough to really make it a conflict. I was going to point out that in this room we would probably have both smokers and nonsmokers, both of them exercising their prerogative, their personal freedom on smoking, but I wanted to point out that this is really an asymmetrical conflict. They would probably agree that there is a conflict between the two groups if you probe them very hard. Especially, those that are emotional about what they are doing. This is an asymmetrical conflict because the nonsmokers are forced to inhale smoke whether they smoke or not. And so, in truth then, the smokers would control the atmosphere of this room and if by hook or crook the nonsmokers were able to establish a no smoking ruling here, then the smokers would be frustrated at the control over them exercised by the nonsmokers. It simply isn't a case of, "you go your way, I'll go mine and there's no problem."

This kind of asymmetrical conflict can be seen almost anywhere you look. On an airplane, the cigarette smokers, by a strange regulation, control the atmosphere over nonsmokers, pipe smokers, and cigar smokers. In a crowded, stuffy room, especially if women are present, the temperature is controlled by the chilliest individual in that room. On a lake, motor boats with water skiers dominate and wreck the environment for canoeists. On a highway, automobiles dominate and ruin the environment for hikers.

Similarly, in the matter of resource use, industry tends to be dominant over recreation. Camping doesn't destroy the forest for the lumberjack, but the lumberjack destroys the forest for camping. A fisherman doesn't bother the air and water used by a smelter, but the smelter ruins these for the fish as well as the fisherman. In short, industry and agriculture tend to dominate the environment they occupy so completely that the recreationist gives up and leaves. Again and again the recreationist is forced to take

whatever is left over, and what is left finally becomes dregs. He does not respond to any advertisements welcoming boaters to the sparkling waters of a settling pond or in the fact that fishing and camping might conceivably be permitted along the irrigation ditches in a wheat field.

My first conclusion then, is that the term, "multiple use," is a mirage for recreation. If we want to promote outdoor recreation on our lands, public or private, this requires a single-use concept, and industry will have to be excluded from the lands.

My second point concerns what might be called the downstream "peck order." To illustrate: Agricultural withdrawals of water for irrigation can ruin miles of downstream camping and fishing. Certain kinds of industrial development can ruin the downstream water quality for both agriculture and recreation. In other words, when dealing with mobile resources like water and air, the asymmetry in the conflict of use extends beyond the immediate vicinity and this also has to be considered in the resolution.

If this discussion makes any sense, it seems to me, we are led to the concept of *state zoning*. Our prime resource for recreation is our wild and semi-primitive lands. By no coincidence are these lands also our virgin forests and our mountain watershed areas. If we want to provide high quality recreation, these will be the areas from which industry and agriculture must be excluded. Here is Zone I, reserved alone for recreation, study, and the preservation of itself. Forestry should be limited to establishing sustained yields on areas already under saw, but should not enter any more virgin areas.

Zone II is dominated by agriculture. It is downstream from Zone I. Zone III is downstream from Zone II. It is dominated by industries other than agriculture.

There is a Zone IV we ought to think about before we drop the subject. That is the zone just beyond the borders of the State. We are a headwater state. What we do to water and air gets passed on downstream. Sooner or later, we will have to consider our neighbors because of the asymmetry in this border conflict. We control their water; they don't control ours. It behooves us, therefore, to work very hard on anti-pollution, not only for ourselves, but for our downstream customers.

To me, careful zoning on a statewide as well as on a local basis appears to be about the only way we can successfully promote the kind of outdoor recreation we dream about. Recreation is no match for industry in any head-on collision of interests. Sad to say, the best of recreation—our wild lands recreation—is no match for the other forms of recreation. Like the very best of anything, wilderness recreation is as delicately poised as the flowers of an Alpine meadow when faced with over-use, trampling feet, and bulldozers.

In another talk back in September at a statewide conference on outdoor recreation, I spoke of a detailed zoning plan with regard to recreation itself. I have copies of that talk available here but unless it becomes pertinent to today's discussion, I won't complicate things by introducing it now.

Suffice it to say, if we really want quality recreation and a quality environment for Montana, we are going to have to work like crazy to protect and nurture the wild lands we have now. History suggests that this is all we will ever have. Firm zoning is one way in which this might be done. It is a principle exploited by municipalities when faced with similar conflicts. National parks are a kind of zoning enterprise on a national scale. The fact that states have not yet attempted zoning is no reason not to lead the pack, after all we have the advantage of the blunders of other states to guide us now *before* our own resources are all committed to projects of lesser value.

Today is as good as any day to get started, so for purposes of this discussion here, I propose the following resolution:

Resolved:

That the Montana Planning Board together with the State Fish and Game Commission, be petitioned by this conference to initiate a series of hearings to determine the feasibility of establishing a State Zoning Plan which protects and capitalizes on our current but rapidly dwindling natural outdoor recreational assets and at the same time provides for an orderly expansion of both agriculture and industry.



DONALD K. WEAVER, JR., Ph.D.

*Director of Engineering,
Experiment Station,
Montana State University*

Industry, Recreation and Pollution

Donald K. Weaver, Jr., Ph.D.

I came prepared to enter into a panel discussion rather than give a speech. However, I have a couple of little talks I can give, more or less independent of one another. I am going to also refer to some of the comments of the previous speakers. Dick, for instance, has pointed out the importance of jobs to Montana. I will take some exception to this kind of presentation in which all industry is presented as a total package. That is, you have a choice of having industry or of not having industry. I rather like to differentiate between different kinds of activities in which people make a living. In Montana I think you are on a little sounder ground if you avoid the use of the word "industry" and describe the activities themselves. I am going to talk about two quite different kinds of activities, the process industry and the human-skill-based industry. The first of these, the process industry, is one I am not personally involved with professionally. I have some administrative responsibility for research that goes on in these areas at the university, but I personally represent the recreationist point of view. However, to make my points I will try to put myself in the position of a plant manager and then you, the audience, in the position of the public.

This first kind of industry (the process industry) is best illustrated by some examples in Montana. These include the smelters in Great Falls and Anaconda, the concentrator in Butte, the paper plant in Missoula, the refineries in Billings and the cement plant in Three Forks. These all involve the processing of large quantities of materials. For this kind of industry there are a lot of things that are fairly important like the sources of raw materials, the problems of transportation, the cost of transportation on a per ton basis and the market for the product. Now, let's suppose that I am the manager of some kind of a Montana process industry. The chances are pretty good that the industry is actually the subsidiary or a division of a larger organization with headquarters outside the State of Montana. Also the chances are that my boss lives outside the state. My boss expects me to make a profit for the company. This is very important, that's why they are in business. They're not really in business to provide jobs, but they can't make a profit without providing jobs (in most cases). So my job really is to look good on the profit and loss statement. The price that I can get for my product is probably determined by the market. I really can't control the market, I have to compete within the market. If I can control the market, great! I'll push the price up as far as I think I can get by with until somebody screams and takes some kind of action. But, the chances are the market controls what I can get for my product. Now, I might be able to make my product just a little bit better so that it is a superior fertilizer or a superior brand of gasoline. However, the place that I can do the most good is in the area of *cost control*. It costs me money to produce this product and I can do a great deal in the form of good management by producing an acceptable quality product that can sell in the market at the market price if I can do this by producing at low cost. Then I'm going to be a successful manager. I will please my boss. I will get a raise. I'll probably get a promotion later on and go to another bigger operation, probably outside of Montana. I'm wedded to the company, I have worked in it all my life, I have a great deal of vested interest in my position and progressing in the company, especially since I've got to this manager position, and so there's no question as to whose interests I put first. However, I still live in the community. I still have all the rest of you as neighbors; I have to employ people; I have to purchase; I have to conduct myself in an acceptable fashion.

Now the process industry generally handles large quantities of materials, changes these in form, uses large quantities of energy, and generally has a good deal of waste. It would be advantageous to get rid of the waste in the easiest possible way. There is really nothing easier than dumping it in a river that washes it away. It's cheap transportation. It is again quite easy to exhaust much waste out of stack and let the wind blow it away. These are excellent ways to control my costs. I may know very well that in the long run there are going to be problems, but I may also know equally well that I can probably get by with it for some time. I put my interest first, of course, in making my product a product which will sell and make a profit. I'm not going to pollute anything intentionally because I want to spoil anything. However, I may be forced to eliminate my waste causing pollution because it is a way in which I can make my operation have lower operating cost. We do have to recognize that our operation must be competitive. We must make a profit, otherwise we won't stay in business. And of course, the bigger the profit, the better job I'm doing as manager. However, I may create a conflict of interest with the public in areas in which I create a public nuisance.

There are a number of things I can do about this, one is that I can initiate a public relations campaign, first showing the importance of my payroll to the community. I can tell people that the smell

really isn't bad, you just have to get used to it. More commonly, the easy approach is to do nothing and hope that the public takes no action. However, I really know that in the long run that if I create a nuisance the public is going to find some way to force me into doing something about it. So my own conscience will tell me to start on a program to try to clean this up. Some managers may decide that in the interest of what they call "enlightened self interest" (where you do something in the public interest because you know in the long run it is really in your interest) that they could clean these things up. If they don't, they know that they will only get into worse trouble and it will probably cost more money later on. Also they will have a bad public image. I think there is a lot of very enlightened management these days. I'm really on the side of industry and management. You see a good deal more enlightened management in industry I know of elsewhere (such as electronic) where the competitive situation is different from process industry. All I am trying to do is show you the pollution problem from the plant manager's view. He has this plant to run. He has lots of problems. He's got labor problems, he's got market problems, he's got public relations problems, he's got lots of problems. That's why they pay him a good salary. You know he earns his salary and he produces a product which is needed. By holding the cost down, in the long run, society does benefit from this, that's one of the things we can say about our country today—our ability to produce things at low cost—we all benefit from this. Look at the car that you drive. That's a fantastic bargain. If I had to build that car in my research laboratory, it would cost \$100,000. So we really get some bargains from this low cost, competitive, efficient kind of production.

Now, let's look at pollution from the public's point of view. I played the role of the manager, now you can play the role of the public. If you don't like air pollution and you don't like water pollution and you don't like noise, then you'd better decide what standards you are willing to accept. You can never get rid of all air pollution, you know, it's just ridiculous. You can never get rid of all water pollution. You can never get rid of all noise. So there must be standards. You must decide now what standards in given environments that you find are acceptable. Now these are things in physical science which are measurable, things which are quantitative. You can't just say, "Well, I want to get the level of pollution down where it doesn't bother me any more," because you know that can't be enforced. We just don't know what bothers you. We need to get it down into how many parts per million you can tolerate or we are willing to accept. Once you've decided on the sets of standards, you must enact legislation which essentially attempts to enforce these standards. You can have all the standards in the world and if you don't enforce them they are worthless. You can have speed limits on the highways that say you cannot go faster than so many miles an hour. You have a speed limit in East Helena. How effective would that speed limit through East Helena be if it weren't for a very alert member of the police force there to measure the speed which you're driving and extract some kind of painful punishment from you if you exceeded the limit? So, if you pass laws based on standards, you must be able to measure these things. You must be able to say something quantitative about the environment. If enforcement agencies are making measurements, you can be sure industry will also measure. You know you have to have a speedometer in your car to know how fast you're going and the policeman has to have a speedometer in his car to measure you. However, industry probably will not measure until it has to and therefore probably doesn't know just what pollution the plant actually produces. We studied the Garrison plant and found they had almost no instrumentation to measure their operations. We studied it for Judge Lessley's court in Bozeman where the case was being tried and we found it very difficult to make measurements. The plant operators knew what they were producing as a salable product, but as what they were producing in the way of injurious air pollution, there were no measurements made. I can't over emphasize this point. If you think you're going to control your environment, you must be able to measure your environment, be able to say something quantitative about it. If you cannot, you do not have any case in court. You cannot enforce whatever laws you've passed.

Now let's suppose your standards aren't good enough. Historically we really didn't have any standards on air pollution until the recent legislation. The public decided on a change. Now, you have a lot of existing industries that are operating, maybe some of them marginally and maybe some of them with a good deal of profit. At least they're adjusted to the old situation. They're used to being able to get rid of their wastes in a certain way. That affects their cost structure. Suddenly you impose something new upon them, which requires capital investment and in the long run increases their operating costs. You can't just pass a law and then expect them to live with it. You the public have a real responsibility in helping them make that transition. I don't know just how you do it. It's probably a situation to which both parties make contributions. You can't just tell industry to "stop." You need to find workable engineering solutions to these problems, and they exist. So, you the public, then have a responsibility to help industry make the adjustment when you change the standards—the standards to which they must conform. Pollution control is a big worry in Montana. These are a few of my ideas on what you do about it. These

things are technically feasible, generally just a matter of engineering and economics, just a matter of phasing them into the budgets, just a matter of getting new construction done. You, the public, must put the pressure on these companies to do it and you must help them so that we can find orderly ways in which it can be done.

Now let's talk about a different kind of industry—the human-skill-based industry. It's the industry that could employ many of the Montanans that we train at the University and export to the more advanced states. These kids, incidentally, would like to live in Montana. Now, recreation has a little different relationship to this industry. First, it turns out to be the "bait on the hook." We can use our pleasant Montana way of life, we can use our outdoor recreation as the way to attract that kind of industry here. Such industry builds attractive plants, landscapes them well with paved parking lots behind. They pay high salaries, hire university trained people and high paid technicians. They don't produce any smoke, they don't require large amounts of energy that change things, they don't handle large quantities of materials. They're not worried about the freight rates. They ship air freight because the thing that's important is time, not low cost of shipping. Their product may weigh 25 pounds and may sell for \$2,500.

Now our recreation has a relationship to this that is quite different. The attraction of quality recreation and living may well be the way in which we can bring this kind of industry to Montana. Once it's here, the very people who are the employees turn out to be the people who join the Montana Wilderness Association, who push on the state and Federal agencies to be more conservation oriented, who fight to preserve the natural environment. They came here because they want to live here. It is their home; they chose Montana based on attractiveness of the way of life, not because some mineral deposit happened to be here. This is the area I would like to see Montana concentrate on for industrial development. I've been trying myself, for about 12 years, to do something and I can't say I have much to show you. We have had a few companies start and a few people make some money. However, we find the competition is very keen outside. As soon as we get anything going in Montana that looks hopeful at all, the people in California and Seattle are smart enough to lure it out. Human-skill-based industry is highly mobile and it can move out as easily as it can move in. However, we do have something important going for us in this kind of life that we have and I think we should use the advantages we have to try to develop the kind of industry that we really want for Montana and the kind of industry that would probably employ our own children.



ARNOLD W. BOLLE, D.P.A.

*Dean, School of Forestry
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Recreation vs. Industry For Montana

Arnold W. Bolle, D.P.A.

Coming on at this point, there isn't an awful lot left to be said. What I had prepared to say has been said several times. I think perhaps the only thing that remains to be done is to try to draw together some of the things in such a way that perhaps we can consider what type of action might be possible or advisable to accomplish some of the things we're concerned about.

For this part of the program to consider a strategy for a livable environment, we have cast recreation versus industry as opposite poles. I think we've seen from many discussions that there is more compatibility and possibly complementarity than there are areas of conflict. Possibly this was set up rather symbolically and recreation somehow represents what's good in the environment and industry what's bad in the environment, but this does not necessarily hold. Recreation isn't necessarily synonymous with a livable environment. I consider the Black Hills on the one hand as a horrible example of what might happen to Montana if we're not careful, in fact, it has happened in a case or two. Industry on the other hand, as Don Weaver just finished pointing out, can very well be attracted by the quality environment we tend to associate with recreation.

Recreation is both an amenity or a side benefit that many of us enjoy and also an industry in itself. As Dick Setterstrom pointed out, recreation vies with timber for third place in Montana's economy. It all depends on which case you happen to be dealing with whether timber is rated third or recreation is rated third. Neither of the figures are really solid enough to prove the point. Nevertheless, they're both important industrial segments of the state's economy, but recreation can ruin an environment faster than perhaps any other use, and Charles Bradley pointed out the need for the protection of these uplands as well as some orderly arrangement of our various uses. Management of our back country calls for very careful consideration. In fact, and we need to do something about them, even the most remote wilderness areas need pretty careful planning of use. If you've visited them you can see the concentration areas that don't look like much of a wilderness. We have conflicts in use and there is no clear cut distinction between what's good for recreation and what's good for industry.

When we examine the future of our industry, we have some possibilities in the extension of primary industries, that is extraction industries. There is still expansion possible in the timber industry. There are coal supplies, oil supplies, metal supplies that are still available and we can expect some expansion of these areas. As Clay just pointed out, we have established controls which are set to protect the public.

There are several types of industry that we don't have here and which we have been slowing losing for years. These are the secondary and tertiary industries. Industries that provide goods that we use every day. Think about all the goods that we're using here today that were not manufactured in Montana. At one time many more of them were processed here, but these small processing and manufacturing agencies are moving to the centers of population. They're consumer oriented and we're not likely to attract any of these until our population is considerably greater than it is. So, in the various classifications of industries, our economy is primarily based on the extraction industries but moving slowly to the various attractive industries, the brain industries that Don Weaver was talking about. We have heard of primitive societies suddenly making the leap to the 20th Century. Montana is a little this way. We are jumping from primary to quaternary industry, largely bypassing the secondary and tertiary industries which have left parts of the eastern seaboard virtually uninhabitable. Brain industries are ones, I feel, that need and can do with considerable encouragement—one that we should be looking at and looking at carefully. Of course, we at the Universities are promoting this because we can perhaps see it better and perhaps we are a bit myopic regarding other possibilities. But this certainly is an attractive possibility and there are excellent examples of this development around the country. Industries of this type congregate, are drawn to universities, I should say, are drawn by universities.

Don Price in his book *Scientific Estate* recently made this point: that it is no longer what you own that's important, but it's what you know. That brain pile is producing wealth more and more. In fact, from this Price develops the idea, the thesis, that the universities, the government, the industries, and the public are coming much closer together in their general interests and that the possibilities of working out some of these very complicated problems we're beginning to face, or are in the middle of, are going to be more possible to solve for this reason. We can get together, our goals are coming together, we're not fighting in opposing directions, our interests are not incompatible. They're very compatible.

In passing, there is one item that was not previously mentioned. We have, of course, service industries. Doctors and dentists and so on who provide us with many services, and these people are generally

interested in a high quality environment, but not always. We've mentioned various kinds of pollution. I'm not mentioning a new one when I mention *scenic pollution*. In this case, I think the public has a real problem with the billboard advertising and I don't think we're very well protected there. I think this is one area in which we need more protection. We need a lot of protection.

I think one point appears to me to become very clear when we talk about the future. We're looking at the expansion that George Darrow pointed out so clearly. Growth and industries are coming and we're not in a position to say, "*You come and You stay away.*" They're going to come and we may have some control of which type we want or what restrictions we want, but to a great extent they're going to pick their own way.

The location of these industries, I'm quite sure, is not going to be dispersed all over the state of Montana. I think it will focus around five or six municipal areas and I think that the problem can be handled in these locations if they have the freedom to do it. There should be authority given locally, assistance given to the local communities so they can do this, can start to prepare for it, and I think too that this should be done very soon. I don't think we've got a great deal of time to delay on this action and I think that the enabling legislation should be passed soon.

We come now to the general recommendations not only from what I have briefly summarized but also some that have come up in the various discussions. What I'm talking about here is primarily legislation. In the final analysis, legislation is the action that we are talking about.

First of all, we need general laws to protect the citizenry of the state in the various areas of the environment: air, water, noise, scenery. In the case of air and water, the state should be in a position of leadership. The fact that the Federal government is acting is all the more reason for the State to take leadership rather than to wait and be controlled by or be opposed to the Federal standards. And, in setting these standards, we should hold as high as we can for as long as we can. I think our quality environment is perhaps our greatest asset. In economic terms, value is related to scarcity and as quality is lost, more and more around the country, ours becomes relatively more valuable and so that the industries and the people who are most attracted to a quality environment will more and more appreciate what we have, I think in this way we can make some selection of what industry we want. My first recommendation is for an analysis of present protective legislation and perhaps further general legislation.

My second recommendation is greater enabling legislation for communities. It seems rather strange, also it's paradoxical, in a state that resents the control of the Federal government in many areas to do the same to communities from a state level. The cities and counties are restricted in the action they can take. The cities and counties should have the freedom to act and they're the ones that are going to have to resolve most of the problems. They should be able to take the leadership. They shouldn't have to wait for the state to decide what's done. I don't think we should fear this, and the state has no reason to fear the communities because this is where the problems occur and this is where they need to be solved. In fact, the enabling legislation should be set up in such a way that any needed form of organization can exist. The city and the county in most cases will have to act together. Many times it will have to be more than a county. It may have to be several communities. I think this should be set up in such a way that these communities can act and also be provided with whatever assistance and leadership they might need. They might need technical assistance, they might need financial assistance, whatever.

The first recommendation is for general legislation, protective legislation, the second is for freedom of the communities to operate. Then, beyond this, I would say we need leadership again from the state in developing a state-wide plan, a planned program for the state, developing a process for dealing with problems. This includes the setting up of goals. We can't set them up forever, recognizing that these might be changing, but setting this up as a living plan, not a once and for all master plan—setting up some kind of operation that can continue to analyze problems, re-analyze to see where we are, and move forward so that we can concentrate whatever efforts we have in this direction. And I think as a part of this we should be moving toward more of the coordinated analysis and decision making of problems, rather than having it dispersed among our many agencies, boards and commissions. Have coordination so that when a decision is made the various people and agencies involved are together on it and the responsibilities are clear. This should also hold between state and federal agencies so that conflict here is minimized. The communities must also be involved so that it is truly a coordinated plan.

As for the encouragement of the types of industries we want and the discouragement of the ones we don't, this can be done in a number of ways, one of them—perhaps the main one—is to protect our environment and hold to strict standards. This will guarantee the protection responsible industries want.

We can encourage them further with certain tax incentives, subsidies, by various types of assistance that are used in many other communities. The basic question we face is: Who pays the *social costs*? Environmental pollution or deterioration is a cost on society, not the polluters. Society pays through the years through deteriorated health, reduced recreation opportunities, a drabber world. We can prevent this: by requiring that an industry, a city or any agent be required to install the necessary preventive measures or not locate at all; or society, the state, community, etc., pays to install the necessary measures to avoid the endless payment by all in a polluted environment.

In most of these situations we have already taken some action, but I think we need clarification of action in all cases, and extension of authorities we already have. I think Montana needs to recognize that we really are not in a desperate situation yet. We do have time to decide but not unlimited time. We're fortunate here in that in general we are where most the other states were a number of decades ago. Our environment is generally in better shape than most, and our resources are to a large extent relatively uncommitted. But the big decisions are still ahead of us. When we recognize this, and also recognize what has happened in other communities such as Appalachia and other parts of the country, it puts a great responsibility on us to avoid these mistakes and to come forward at this time to take the steps we need to take to create the type of Montana we want. I think we should also resist the urge to commit our resources too far ahead. If we commit them beyond what we can reasonably foresee, we may be making some pretty severe mistakes just on that basis, because needs are changing rapidly and we can't foresee the future too clearly at any one point. But really the best we can do is to leave the situation as open as possible by protecting what we want while permitting the future the widest possible array of choice. I think this is one of our main responsibilities in the future.



ROY E. HUFFMAN, Ph.D.

*Vice President for Research
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Summary Comments

Roy E. Huffman, Ph.D.

When I looked at the program and saw that there was an hour and a half for the summary, I was prepared to relieve your minds by telling you in no uncertain terms that there would be no problem in getting you out of here on time. I think this can still be done, but just in case of an emergency, I would like to ask Senator Mitchell or Representative Darrow to be prepared to hang his coat over the clock at the back of the House Chamber. They have had experience in that business. For those of you who haven't been up here behind this rostrum, you will be interested to know that there is a trap door in the floor. I'm reminded of the fellow who had just finished a speech down in the eastern part of Montana. He looked up and saw two cowboys coming down the aisle with a rope. He started looking for an exit but the master of ceremonies said: "Relax, they're not coming after you; they're coming after the program chairman." So, I hope I don't go through the trap door and I hope Mr. Brinck doesn't either. You've all heard the old statement by somebody who has just been introduced and says he can hardly wait to hear what he is going to say. Well, there is more truth than humor to that statement here this morning.

I have made no attempt to repeat statement by statement in any kind of order what has been said by the various speakers. What I tried to do was find some central focus to this conference as expressed in the presentations and discussions. I have a prepared statement here which I finished in the middle of the night and I also have a key running down the side of it to help me illustrate from the presentations and discussions.

The presentations at this conference were intended to cover the broad range of man's concerns with his Montana environment. I believe that they have accomplished this purpose. The discussion groups provided depth and added specific viewpoints to the perspective developed by the speakers. In both the discussions and presentations, there were varying degrees of emotion and objectivity. In some of the discussions there were errors of fact that went unchallenged. This illustrates the need for more information, more discussions of this kind, and, of course, the benefits as well as the problems involved in this mutual self-education process.

A central focus of concern was obvious throughout the conference. It involved basic conflicts in interests and values. We find these conflicts expressed in many ways that I think make one major problem out of a multitude of problems.

The first way that we might find the purpose is to say that the major problems facing Montanans relative to their environment can be expressed as a question: How do we use our natural resource environment to achieve desired economic goals and, at the same time, maintain desired social and aesthetic values? As one participant described the situation, "We have to be realistic and recognize that we cannot turn the whole state into a wilderness area."

The second way that we might express our concerns in terms of a focus as one major problem is to say that Montana people are concerned with both a place to *make a living* and a *place for living*. The view was expressed in one discussion group that "economic growth and development does not have to be ugly."

A third way to state the major problem is to say that Montana people are concerned not only about the quantity of things available to them in their environment, but also the quality of the environmental factors. This would appear to be a basic characteristic of a society that has reached a level of affluence far beyond the problems of subsistence.

Our concerns may also be pulled together in another expression of a major problem as we seek an acceptable strategy for a livable environment. The fourth way is related to the almost unlimited technology available to us. Technology can be used in such a manner as to destroy many of the most desirable features of the environment or it can be used to maintain and improve the environment. The insistent goals of society, whatever they may be, if they are made loud and clear enough, can have much to do with the direction of future technological development and use.

Our speakers stated some of these problems in various ways. Our keynote speaker, Mr. Svore, started off by emphasizing that we have to make compromises and that it is impossible to turn the clock back even though we may have the technology to do so. It is impossible from a practical standpoint. He said that in the western states setting, if we are willing to follow a type of preventive planning, we can minimize the extent that problems now prevalent in other states come to Montana.

Mr. Brown talked about some of the interactions of environmental control procedures. He emphasized some of the types of legal control that have been under discussion here this morning. Mr. Darrow emphasized what I think is an extremely important point as it relates to our particular situation because we do put a lot of emphasis on the space available to us. He pointed out that the geography of open space no longer insulates us from the problems and challenges that face the other areas of the nation. I'm talking specifically about Mr. Darrow's predictions regarding the growth that this state might see in comparison to Arizona. I have had some involvement with the problem of projecting what's likely to happen. The one thing I am sure about is that if people had tried to project the future growth and development of Arizona and New Mexico at the end of World War II they would have missed it so far that they wouldn't admit they had even tried. There were some things that were not obvious at the time and I think you can see the possibilities for Montana today as I suggest these things to you. No one had any idea really that people were so enthusiastic about living in the desert and in an open space situation. No one had visualized what could happen in terms of relating to that particular geographic situation. And I suspect that no one had taken a good look at what the impact of government activity can be on the growth of an area.

People are becoming a little more concerned with the broad considerations involved in the environmental problem. Our keynote speaker talked about noise and solid waste disposal and other problems of this type. Everytime I hear somebody discussing the growing problem of waste disposal I am reminded of what a scientist in the Public Health Service in Washington said to me a couple of years ago. He said, "The biggest mistake man ever made was when he built the first sewer in London because ever since then he has thought that the only way to get rid of waste was to float it off on water." This is a kind of mental block we've had for a long time that has slowed consideration of other disposal techniques.

This attempt on my part to consolidate many of the problems into one major problem of concern regarding the environment does not provide a simplification of the problem or suggest a simple answer. It does focus our attention on the kind of conflicts we have between the economic and social, between the materialistic and the aesthetic, between the purist and the realist. Society, whether it be in Montana or elsewhere, is plagued by simple solutions to complex problems. This conference has demonstrated that there are solutions to the problems at hand, but they are not simple. In large measure this conference has destroyed the myth that there are always people in black hats and people in white hats with the black hats shooting up the town and overgrazing the range and the white hats defending the heroine and the home ranch. Most of the people I have listened to are wearing some moderate shade grey hat. They are ready and willing to discuss all aspects of the environmental problem. If there is a two-part society at this time, the dividing line is blurred between the people with a materialistic viewpoint and those with an altruistic interest who often consider themselves to be the only defenders of the public interest.

As I said earlier, this conference has brought to many of us a broader concept of the environment. The presentations and discussions have been concerned with man-made features of the environment as well as those endowed by nature. I think we should note that only one reference was made at this conference regarding the role of weather modification. This is obviously one of the factors that is involved in the impact of technology on the environment and how man is going to use his technology.

There has been recognition of the great need for accessible recreation as well as for opportunity for completely isolated wilderness recreation. It has been pointed out that the existence of our whole economy and society in Montana is related to outdoor recreation. The fact that we are becoming a younger and younger people has increased the recreational needs of our population. The economic facts of life suggest, however, that recreation as an industry can exist only as a part of a system of balanced economic growth and development. This conference has talked about this and said part of our environment is determined by our ability to earn a livable income. If we are going to enjoy some of the intangible things, we have to be able to pay for many of them, directly or indirectly. Doctor McConnen presented a specific proposal for expanding an existing economic activity.

The environment itself has been shown to be a complex system wherein acts in one location will have effects in another location. This runs the whole gamut of the disciplines—physical, biological and social sciences. It has been demonstrated by Doctor Solberg that the impact of technology could be so great as to endanger the continuation of a global environment that will support human and other life forms. It was pointed out that our global environment is a closed system and the world must live within itself, and the population will increase the demand on the closed system all the time. Doctor Stoenner

followed some of the same ideas in relating to some of the problems of diseases and the human health problem. Doctor Jutila said that man uses the tools of his technology in anticipation of a more creative, productive and pleasurable life. With his technology, man has produced deleterious changes in our environment which seriously impair the health of man and may eventually destroy man himself.

Most important of all in planning a strategy for a livable environment is the need for compromise. This point was repeated throughout the conference. Compromise is a fundamental characteristic of our governmental system. This conference indicates that the major problem requiring compromise is probably in the industrial and recreational uses of the environment. I wandered around and listened to some of the discussion groups. I jotted down ideas in some cases as they were stated and in some cases in my own words. I would like to give you a few of these. One was that the use of food, shelter, clothing, and living space can't be eliminated through some sort of an undisturbed environment. We can live in harmony with the environment and this is part of the problem we are discussing today.

The second one is that the environment is used for the benefit of human beings and the total society in one way or another. Some individuals in the society would separate individual interests and values and isolate them from the interests and values of the total society. A framework must be found somewhere within the total society for putting these goals and values together. I thought I heard too that part of the philosophy of what we call the Big Sky Country is the idea that we can preserve the environment in some sort of a livable framework that will be acceptable to the general public. We certainly should recognize that we may have a great deal more to say about how the job gets accomplished if we proceed to develop positive goals and programs. It has been interesting to me over the past year to see the growing recognition of the need for public planning. We have recognized that planning is necessary and inevitable and that in order to do the job we have to accept a certain amount of restrictions and regulations.

It hasn't been very long ago that the advocates of planning and zoning were very likely to get an extremely unfavorable label. Fifteen to twenty years ago I talked about planning and zoning when I was teaching classes in land economics and public water policy. Once each year I would say to my students: "Between now and the next class, I want you to think about this question and then come back and talk about it. 'Why is it a perfectly acceptable American practice to carry on zoning in incorporated towns and cities, but as soon as we cross over the city boundaries into the country, it becomes socialism if not worse?'" This was an interesting technique that caused the students to sort out some of the emotions and biases involved in values and goals. I was pleased this morning when my colleague and good friend, Charles Bradley, came up with a very positive proposal for zoning for recreational and other uses. Charles should do this because he comes from Wisconsin and that state has thirty years of experience with rural zoning designed to do some of the things we are concerned about in Montana.

I think this conference has opened some ways to improve the communication that is necessary to achieve some compromise of interests and to achieve a balance of goals. Some say that we always spend too much time talking and that further talk is pointless. I think we must improve the decisions we make but we are not quite ready to make all of the decisions. As Dean Bolle said, "We don't want to see some of these things come too fast." We have to continue this kind of meeting and discuss some of the things the people are concerned about as expressed in the discussion sessions of this conference. We have to continue to communicate and exchange ideas and information and find answers that are both feasible and acceptable. We must recognize the real nature of the environmental situation and that we have a great many different situations to be considered in Montana. One discussion group talked about the differences between the environmental situation in some parts of eastern Montana and the western Montana mountains; the difference between the Montana environment and other areas of the nation and how this all relates to the world environment. One of the most interesting discussions that I heard suggested that we should pattern Montana development after Switzerland where a high quality environment has been maintained. The implication was that Switzerland has a single-purpose economy oriented around outdoor recreation. I visited Switzerland two and a half years ago and I thought about the same thing as a pattern for development. I know, however, that there is not as much of a one-industry kind of situation as the discussion here suggested. Switzerland does not have an economy based upon recreation alone but they have fitted it in very well. Some of the things that we've talked about here are the kinds of industries that fit. They are the kinds of industry that Doctor Weaver talked about earlier this morning. We have to recognize that, in terms of a stable economy, recreation is a highly seasonal industry in most places. There are growing possibilities of balancing summer tourism in part with winter recreation activities, but it does not provide an adequate year around economic base.

There are some comments that I should make from the written reports that were given me from the discussion groups. There is a growing recognition and interest in the need for state wide planning and zoning. One of the groups emphasized planning on a community and district basis. There was emphasis on planning for recreation balance and involving both government and industry. There is a certain amount of discontent with present and future recreational opportunities and possibilities because there is concern about what recreational development will require in the way of regulations, zoning, and things of this type. There is a question of what type of recreation should be involved and what kind of facilities. There is a continuing concern regarding the need for some designation of water rights for recreational use. All through the reports, I found concern about the possibility of using zoning to guide development. There is concern about the effects of timber harvesting, strip mining, etc., on aesthetic values. There was much discussion of air pollution and the need for planned developments in accordance with problem areas and zoning of the areas of use with reference to the obvious physical problems that are going to develop and that can be predicted. It was said that in some cases there is insufficient knowledge regarding the things that are needed to control some of these situations. In the area of consumer protection, there were a number of specific proposals made as many participants feel that there are already too many licensing agencies. There was a stated need for better educational programs related to consumer activities.

While there are problems in the existing Montana environment, the discussions here indicated that the problem is not as complex or advanced as in other areas of the country. More important, we are not yet faced with large scale restoration of an environment already badly damaged or lost. Happily, we have the much more pleasant problem of maintaining an environment that now provides a pleasant place for living as well as for making a living.

There is nothing in all of this to cause us to be complacent. We could easily slip over into the other category involving major problems of restoring the environment. If we really recognize the nature of our situation, if we really recognize what we've been talking about here for three days, we are headed in the right direction. What we need is a lot of dedication and a lot of effort.

I want to close this summary with a quotation. It is not from a famous man. In fact, I don't know who he is. The quotation is from a Mr. J. M. Powell of Leeds, England, who wrote a letter to the editor of *Newsweek Magazine*. It was carried in the issue for April 22, 1968. Mr. Powell wrote, "One thing is for sure: You can't measure the quality of life by the quantity of the gross national product."

**SUMMARY
FOR
GROUP DISCUSSIONS**

Recreation

Recreation is an industry of sufficient magnitude in Montana to make it worth preserving. There should be a statewide coordinated plan under leadership and guidance of a state agency. The program should be initiated at the local level and incorporated into overall county plans which in turn would become part of the state plan. Any plan must recognize that some areas of the state are not climatically suited to industrial development but at present have a good recreational potential. Industry, agriculture and recreation must be conducted in a manner to be compatible with each other and to the best economic advantage of the state.

Only a small select group benefits directly from tourist trade. Any plan must provide for more people visiting the recreational sites which in turn will require more control or management in order to prevent pollution of the recreational areas. Planning should be in cooperation with the government, industry and all phases of private enterprise.

The recreational use of water should be given legal status as being of beneficial use.

If recreation standards are to be developed, they should include the thinking of all concerned such as sportsmen, industrialists, agriculturists, dude ranchers, hotel owners and builders with no single group dictating. It will require education to get the people to be working together.

Constructive agriculturists are conservationists; however, agriculture is necessary for life, and is needed in spite of any water pollution. Small dams at the headwaters are preferred to large dams downstream. People are not concerned with the environmental problems unless they are personally affected.

Desirable recreation facilities may serve as an inducement for industry to locate in Montana. Recreational facilities that are not maintained lead to "slum" conditions. Some residents question the desirability of increasing the number of people utilizing Montana for recreational purposes.

Montana has a great variety of recreation available since it is at the headwaters of two river systems and between two major national parks. There are many fishing streams and lands available for hunting.

Recreation is compatible with other activities in Montana if proper planning is done. Highly desirable recreation can be developed in areas that are not suitable for other productive industries. Montana cannot be solely for recreation. An agency that recognizes the total needs of the state should be designated to do overall planning in order to zone for recreation and other land uses.

Air In the Environment

A basic decision that must be made by the state is what level of air purity can be maintained within the ability and willingness of the state to support it. It is recognized that there is lack of knowledge as to means of controlling air pollution for some industries and some wastes.

It is also recognized that some mountain valleys may have greater air pollution problems than other localities. In order to control air pollution, there must be some type of zoning. Regional zoning appears necessary since local zoning is inadequate for controlling pollutants in the general air movement.

If Montana maintains a clean environment, it will attract "clean" industry. "*Dirty*" environment attracts "*dirty*" industry. The pollution caused by people and autos is generally greater than that from industrial pollution.

Consumer Protection

Consumer education should start early in life, being taught in elementary and secondary schools as well as colleges and should be taught to men as well as women. This is necessary in order to implement more effective protection against economic fraud, adulteration and misbranding.

These are areas where the consumer by being alert can protect himself. There are other areas where governmental control is necessary. There are many agencies involved in consumer protection. The areas of responsibility should be delineated in order to reduce the cost of the entire protection program. However, while this may be desirable, a single large central agency may not obtain sufficient funds to take care of the entire protection program whereas several smaller agencies may receive smaller amounts and cover particular areas. Duplication means that many establishments must have licenses from several agencies. The state agencies are forced to cooperate with many Federal agencies and some Federal agencies that are responsible for a broad spectrum of programs may have to work with several different state agencies that have responsibilities in small areas.

Pesticides are very necessary; however, there is need for more education, research and control both of the product and their applications. More funds are needed by the Health Department for pesticide programs.

Water In the Environment

It is easier to maintain a high quality water when you have it rather than to restore degraded water. Water uses must be reviewed. The question was raised as to whether or not irrigation pays its share for large dam construction or is this taken care of by hydropower. Flood control is an important side advantage of the large dams.

Montana needs a broader economic base. Water and irrigation help to increase the tax base to provide greater production and attract new industries. Montana water must be utilized for Montana.

Legislation is needed to indicate that water for recreation is a beneficial use. Tax relief and subsidies should be considered in pollution control programs involving water, air and solid waste.

Disease In the Environment

Preventive medicine with alteration of the environment should be practiced rather than curative medicine. Many air particles are not yet identified nor their seriousness in disease. Asbestos particles in air and industry cause at least 50 known diseases. Hydrocarbons cause disease. There is a theory that the life span can be extended with good environment and fewer insults to the body. Present studies indicate that small negative ions in the atmosphere are beneficial to plant growth and may also be beneficial to humans.

Proper handling of foods can control Salmonella. Encephalitis can be controlled by mosquito control.

There is some feeling that restrictions on use of certain chemicals and antibiotics are made in a vacuum without knowledge of the entire program. When major decisions of this type are made, a scientific panel or commission should review such decisions before they become final and more research encouraged.

Government Asked to Make Study of State Zoning Plan

By Jerry Halloran
Independent Record
State Bureau

Montana's government has been asked to study the feasibility of a state zoning plan aimed at easing the conflict between outdoor recreation, agriculture and industry.

A resolution calling for such a study by the State Planning Commission, the State Fish and Game Department and the State Board of Health was strongly endorsed Thursday at the closing session of the statewide conference on "A Montana Strategy for a Livable Environment."

The unique proposal, which would establish specified areas in the state for recreation, agriculture and industry, was proposed by Dr. Charles C. Bradley, dean of letters and science at Montana State University, Bozeman.

Provide for Orderly Expansion
It was adopted in resolution form by about 70 conference participants, many of whom are leaders in industry recreation and conservation fields in Montana. The resolutions calls on the three state agencies to "initiate a series of hearings to determine the feasibility of establishing a State Zoning Plan."

which protects and capitalizes on our current but rapidly dwindling natural outdoor recreational assets and at the same time provides for an orderly expansion of both agriculture and industry." Such a zoning plan would be part of current statewide planning efforts.

In his address, Bradley spoke of a four-zone concept, as follows:

Zone 1, reserved for recreation, study and the "preservation of itself. If we want to provide high quality recreation, these will be the areas from which industry and agriculture must be excluded."

"Forestry," the MSU professor said, "should be limited to establishing sustained yields on areas already under saw, but should not enter any more virgin areas."

Agricultural Land

Zone 2, downstream from the land reserved for recreation, would be dominated by agriculture.

Zone 3, downstream from zone 2, would be dominated by industries other than agriculture. Zone 4 would be beyond the state borders because Montana is a headwater state, it must "work very hard on anti-pollution, not only for ourselves, but for our downstream customers."

Bradley said zoning is the best way to promote outdoor recreation. Montanans dream about "in short," he explained, "industry and agriculture tend,

to dominate the environment on our current but rapidly dwindling natural outdoor recreational assets and at the same time provides for an orderly expansion of both agriculture and industry." Such a zoning plan would be part of current statewide planning efforts.

Earlier in the session, two other speakers told the conference that Montana can use its outdoor environment potential to attract the kind of industry the state wants.

"We should use the advantages we have to try to attract the kind of industry we really want and the kind that will hire our children," Dr. Don Weaver, director of the MSU engineering experiment station said.

"Our quality environment is our greatest asset," agreed Dr. Arnold W. Bolle, forestry dean at the University of Montana. Missoula. He also suggested the cities and counties should be given more power by the Legis-

lature to take steps to protect that environment.

He said it is "paradoxical" for a state that resents federal government control to exercise the same type of control over its cities and counties.

Both Bolle and Weaver urged the state to use its clean environment to attract clean "human-skill based industry."

Recreation can attract that kind of industry, Weaver noted; and, in turn, that type industry will hire the type of people interested in preserving Montana's environment.

Such "brain-oriented industries," are producing wealth more and more, Bolle noted.

BILLINGS GAZETTE, May 24, 1968

State's Livable Environment Needs Safeguards; Zoning Plan Offered

By J. D. HOLMES
AP Capitol Writer

HELENA (AP) — Three state agencies were asked Thursday to determine the feasibility of establishing a Montana zoning plan that would promote outdoor recreation while providing for expansion of agriculture and industry.

Another story on page 1. Asked to hold hearings on the concept of such state zoning were the Planning and Economic Development Commission, the Fish and Game Commission and the Board of Health.

As proposed to the conference by Dr. Charles C. Bradley, dean of letters and science at Montana State University, the state zoning plan would protect and capitalize on Montana's "rapidly dwindling natural outdoor recreational assets."

Delegates to the three-day meeting also proposed that Ted Wirth, Billings landscape plan-

ner, head a task force to spread statewide the importance of maintaining a liveable environment.

Speeches and panel discussions at the conference were summarized as showing that Montana's environmental problems are neither as complex nor as advanced as those of other states.

Dr. Roy E. Huffman, Montana State University vice president for research, put it this way: "While there are problems in the existing Montana environment, it is obvious that the problems here are not as complex or as advanced as in other areas of the nation."

"More important, we are not yet faced with large-scale restoration of an environment already badly damaged or lost," he said in summarizing the conference sponsored by the State Department of Health.

"Happily," Huffman went on,

"we have the much more pleasant problem of maintaining an environment that now provides a pleasant place for living as well as for making a living."

Huffman warned the conferees not to be complacent, saying, "We could easily slip over into the other category involving major problems of restoring the environment ... What we need now is dedication and effort."

He said the conference, held in the House chamber of the Capitol, focused attention "on the conflicts between the economic and the social, between the materialistic and the esthetic, between the purist and the realist."

"In large measure," said Huffman, "this conference has destroyed the myth that there are always people in black hats and people in white hats with the black hats shooting up at the town and the white hats defending the heroine and the home ranch."

"Most of the people I have listened to here are wearing some moderate shade of grey hat. They are ready and willing to discuss all aspects of the environmental problem."

Huffman said that if there is a two-part society, "the dividing line is blurred between the people with a materialistic viewpoint and those with an altruistic interest who consider themselves to be the true defenders of the public interest."

Among speakers at the event, which opened at 1:30 p.m. Tuesday and ended at noon Thursday was Richard C. Setterstrom, area development manager for the Montana Power Co.

Setterstrom said nearly half of the state's 963 manufacturers employ three persons or fewer, and about half of the employment by industry in Montana is by 23 companies.

He called for these goals: steady employment; wide use and conservation of natural resources; planning and zoning; community improvement; high quality education; high quality recreation; develop in people greater pride in their communities and state.

The Daily Inter Lake, Sunday, June 2, 1968 PAGE THREE

Pollution Control Need Cited

"We must face the pollution problem like a forest fire and do what is necessary to control it," Dr. Jessie Bierman told Kiwanians recently in reporting on her participation in a state conference on a liveable environment.

Dr. Bierman, a native of Kalispell, a one-time pediatrician in the bay area of San Francisco and now retired at Lakeside, told of the devastation of the beauties of the bay area over the years and concluded "it can happen and is happening here."

Dr. Bierman said the state conference reached some interesting judgments: Our Montana natural resource environment is one of the few remaining unspoiled domains; agriculture is the biggest user and the biggest contaminator of water; standards of acceptable pollution must be established; pollution control is costly and must be expected to be reflected in the price of products; multiple use of natural resources is largely an illusion being dominated by agriculture and industry with recreationists taking what is left; the zoning of the state was suggested; and plans should be made to encourage "quality" industries which are "clean."

Some in the conference projected a great influx of people into Montana within the next 10 years and it behooves the people of the state and agencies to plan now, she said.

Dr. Bierman was introduced by Dr. Malcolm Burns with Forest Rockwood in charge of the program; Kiwanis president Bob Scherpensele presided.

INDEPENDENT RECORD
May

Jerome H. Svore

Conference On Environment Opens Tuesday

Jerome H. Svore, director of the National Center for Urban and Industrial Health, Cincinnati, Ohio, will be the keynote speaker for the conference on "A Montana Strategy for a Livable Environment" which will begin in Helena Tuesday.

The purpose of the three-day conference will be to set forth the problems and to try to establish a guide as to where the state might be going in management of the environment. Legislators, state agency officials, representatives of conservation and industrial groups, and other interested people from throughout the state have been invited to participate in the conference. The conference is being sponsored by the Montana Department of Health.

Svore was appointed director of the Public Health Service's National Center for Urban and Industrial Health on January 1, 1967. He is the first director of the newly-created Center, which is the focal point for many Public Health Service programs concerned with the identification and elimination of environmental factors in our urban, industrial society which threaten man's health and safety.

Wednesday, May 22, 1968 Great Falls Tribune 5

Rec-Industry Balance 'Necessary' for Montana

HELENA (AP) — Gov. Tim Babcock told a conference Tuesday on keeping Montana's environment liveable its participants should not "create other problems which would overshadow our achievement."

He spoke to the "Montana Strategy for a Livable Environment" meeting which opened Tuesday and continues through Thursday.

Babcock said the trend is for population to move into the nation's midsection and to avoid the crowded coasts.

"It is of the utmost important that Montana recognize this inevitable movement and that we start preparing now for the future," Babcock said.

Noting a panel discussion due Thursday on "Recreation vs. Industry for Montana," the governor added, "with careful and logical planning we can keep such conflicts to a minimum."

"Montana is unique in its appeal to industry," he said. By anticipating industrial and recreational needs, "we can attract the kind of industry which enhances rather than detracts from our environment."

Remarks in a similar vein were offered by Rep. George Darrow, R-Billings, who told the group that other U.S. areas once enjoyed environmental assets similar to those of Montana.

"Failure to consider the unintended, unwanted and unforeseen consequences of their technological arrogance toward nature has resulted in the common tragedy of an environment blighted beyond repair."

He said Montana has a "fleet option" to anticipate the cumulative effects of population expansion and "the massive impact of modern technology" on the economy and the environment.

Environment: Montana Fabulously Endowed Despite, Not Because of, Its Residents

By Jerry Holloran
Independent Record
State Bureau

Montana remains a "fabulously endowed" state in environmental and recreational potential, rather than because of the actions of its residents, a University of Montana professor said here Tuesday night.

Dr. Richard L. Konizski, a forestry professor at the Missoula school, said state residents "only recently, and perhaps too late," are realizing the true value of Montana's unique natural endowment.

Dr. Konizski traced the effects

argued a point that Montana has a better environment than most other states. But he emphasized that the state must plan to save "what we already have corrupted beyond any possible chance of rehabilitation."

He named agriculture, "certain self-serving federal agencies" and industry as the "greatest a sassinato" of the state's environment and recreation potential.

Agriculture, Konizski said, is the largest single polluter of water, to which most of Montana's recreation potential is linked. Industry, he continued, pollutes air and land, as well as water.

And several federal agencies, such as the Bureau of Reclamation, the professor added, are sacrificing Montana's environment in favor of public works, specifically large dams, designed partly for their own security.

Save What We've Spoiled
The Missoula man did not

agriculture, mining, logging and other industry have had on Montana's environment.

"We are the planners, the designers, the developers, the guardians of Montana's future," he told his audience. That trust, he continued, requires each Montanan to act for the benefit of future generations, rather than for personal profit designed to caput, the "last buck—the almighty dollar."

Earlier in the evening, Robert F. Cooney told the conference "a state ever had a chance to maintain a superb environment and outdoor recreation opportunity, it is Montana and now."

Cooney, assistant chief of recreation and parks for the Montana Fish and Game Department, said Montanans "still have going for us" despite logging scars, some air and water pollution, erosion, outdoor signs and junkyards.

"We have them all," Cooney Darrow, R-Billings, both warned

the roots of the problem also are growing in this state. Montana Darrow said, has a "fleeing option" to maintain a high quality environment "appropriate to the majesty and the eternal affluence of our natural surroundings."

Other Speakers

That was the message delivered by two speakers Tuesday at the three-day conference on "A Montana Strategy for a Livable Environment" opened. Planning and action today are more practical and cheaper than waiting until serious, perhaps unsolvable problems are created, warned Dr. Jerome H. Svore, director of the National Center for Urban and Industrial Health in Cincinnati, Ohio.

"For me to come out here and talk about the quality of the environment seems a little bit silly," Svore added, noting that problems of pollution, ghettos, occupational safety and sewage disposal are much more serious in highly populated states.

But he and State Rep. George

the problem isn't as "compelling" in Montana, he noted. But several of the state's cities, Svore said, are in the "beginning stages of urban blight."

Both Darrow and Gov. Tim Babcock, who opened the conference, warned of an inevitable movement of population to Montana. And they agreed the state's relatively clean environment can be used to attract, in Babcock's words, "industry which enhances rather than detracts from our environment."

"Other areas of the United States once enjoyed similar environmental assets," Darrow noted. "Failure to consider the unintended, unwanted and unforeseen consequences of their technological arrogance toward nature has resulted in the common tragedy of an environment blighted beyond repair."

Predicting that Montana's population will more than double by the end of the century, Darrow said that Montana need not follow in the steps of the other states.

We Have Assets

Montana, according to Darrow, has "some unique assets to employ in maintaining the unique quality of its environment." Most important, he said, the state still has a little time left to plan.

And, the Billings geologist continued, Montana's space can absorb orderly, planned growth. The fact that the two largest river systems in the country begin in Montana means the state does not have to deal with upstream pollution. And the national parks and forests within the state's borders "are insured housing," he added, "that the state's wilderness areas will continue to be available to future generations," he concluded.

The Independent Record, Helena, Montana, Thursday, May 23, 1968

Professor Says Water Polluters Should Have to Pay for Actions

Independent Record
State Bureau

Montana should develop legislation that would make water polluters pay financially for their actions, a Montana State University professor recommended here Wednesday.

"If a particular kind of pollution is deemed to be undesirable, we have to find a way to make it more expensive to pollute than to not pollute," Dr. R. J. McConen, an agricultural economist professor told the statewide environmental conference here.

McConen called for realization of four elements essential to Montana's water strategy:

1. Water resource can be used to expand the state's economic base.

2. Water pollution has not only a measurable impact (causing disease, destroying aquatic life), but also a "symbolic impact on what we think our environment should be."

"Our primary concern (with water pollution) may be that our image of the land we live in

has been violated," he commented.

3. The kinds of water pollution the state won't accept must be spelled out.

4. The unacceptable types of pollution must be halted by making it more expensive to pollute than not to.

Because It Is Cheaper

"Usually," McConen said, "water is polluted because it is cheaper for the polluter to pollute water than to not pollute water. A polluter is not an evil man. It is just that some of the costs are external to his operation."

He said there are three ways that the detrimental pollution can be made unprofitable to the polluter.

—Stiff fines and possibly jail sentences for persons violating a law prohibiting pollution.

—Use of public funds to subsidize "clean" activities which otherwise would be uneconomic or treatment facilities. That now is being done for municipal sewer treatment plants and secondary sewer systems, he pointed out.

—Internalize the cost of pollution by "having the polluter either pay for treatment or for any damages involved."

McConen predicted "persistent" pollutants, such as pesticides, "will become our most serious water pollution problem."

Consider Water Transfer

Also speaking on water matters was Everett V. Darlington, Montana Water Resources Board director, who suggested future consideration of the possibility

of transferring water from the Columbia Basin in Montana to the Missouri Basin within the state.

He made the suggestion after noting that although four-fifths of Montana's land is in the Missouri Basin, only two-fifths of its surface water is there.



GREAT FALLS TRIBUNE, May 26, 1968

Capitol Comments

By JERRY MADDEN



GREAT FALLS TRIBUNE, April 16, 1968

Better Living in Montana Is Aim of May Conference

HELENA (AP) — A May 21-23 conference designed to help develop guidelines that will lead Montana toward a better environment—making for better living conditions—was announced Monday by the State Board of Health.

C. W. Brinck, the board's director of environmental sanitation, told newsmen the three-day conference in the House chamber of the Capitol is entitled, "A Montana Strategy for a Livable Environment."

He said its purpose is "to help set the direction for better managing the environment for the benefit of those in a position to make decisions concerning the future of our state."

Being invited to attend are elected state officials, members of state agencies involved with environment, representatives of various conservation and industrial groups, the League of Women Voters and the Federation of Women's Clubs.

The expected 180-200 delegates will be welcomed at 1:30 p.m. May 21 by Gov. Tim Babcock. Next to take the rostrum will be the keynote speaker, Dr. Richard A. Prindle, assistant surgeon general with the U.S. Bureau of Disease Prevention and Environmental Control.

Rep. George Darrow, R-Billings, will talk on "Montana's Choice: Unique Quality or Common Tragedy." Other talks will deal with recreation, air, disease and water in the environment and with consumer protection.

There will be discussion groups on each subject.

The final day of the conference will feature a panel discussion on the subject, "Recreation vs. Industry for Montana."

"It is planned to reproduce the proceedings of the conference and make these available to elected state officials, program participants and others," Brinck said.

HELENA — Pollution is a lot like the weather — everybody talks about it but nobody does anything about it.

For almost two full days last week, the best minds of Montana—scholars, legislators and technicians—talked about pollution here at the State Board of Health sponsored "A Montana Strategy for a Livable Environment" Conference.

Much of the information disseminated was highly technical and much above the head of the average guy like me who just came to listen. However, it was during a panel discussion on the final day that it all began to make sense.

Dr. Donald Weaver Jr., director of the engineering experiment station, at Montana State University, personalized the situation of pollution by portraying himself as industry, and the audience as the public.

He pointed out there are several kinds of industry, but that which the public usually thinks of in terms of pollution is the process industry, including plants.

"The problems of this industry," said Weaver, "result in treading on the toes of the public. Chances are the boss is somewhere else and he expects me, the manager, to make a profit for the company. I can't control the market and must compete, so what makes me look good is a profit and loss sheet favoring the company."

Weaver said the process in-

dustry generally has a good deal of waste

"It is easy to wash away or let the wind blow it away," he continued, "which is an excellent way to control costs. There will be problems but I'll get by for some time. I don't pollute intentionally or because I enjoy it, but I must be competitive."

"I will have a conflict of interest with the public," said Weaver, "and there are several things I can do about it. Get a good public relations division which will tell the people the smell really isn't too bad and the payroll is important to the community. The people in the plant say they get used to it, but I admit, one does eventually get saturated."

"Another way," said Weaver, "is to make the best of it as long as I can, knowing eventually the public will close in on me. The heck with it. I won't do anything until I am forced. That's what I sometimes think they do at Garrison," he added, referring to the highly controversial operation of the Rocky Mountain Phosphate Co. plant.

"I can see the point of view of the manager of such industries," he said. "He's got problems. That's why he gets paid a good salary."

Then Weaver elaborated on the attitude the public, or the audience, could take.

"If you don't like pollution," he said, "decide what standards you are willing to accept. You will never get rid of all pollution, but no standards can be

enforced until you decide what's bothering you

"And you can have all the standards in the world, and if you don't have enforcement, they're no good," stated Weaver, "they're no good unless there is an alert policeman to speed it."

"You can't just pass laws and expect industry to live with them," said Weaver. "You must help with the transition. We need valuable engineering solutions to the problems. They exist and are technologically feasible. It's just a matter of economics."

As a solution to many of the problems of industrial pollution, Weaver suggested that Montana court the "human skill-based industry," such as electronic firms.

"They could employ all the Montanans we train and export," he said, "and recreation is the main bait on the hook which attracts them."

"Those who come here," he continued, "come through choice, not because some body was found here. These are the type of industry and people we would like to have."

But, Weaver pointed out, it is not easy to attract or keep such industry.

"The competition from outside is strong," he said, "and Washington or California lures them away as soon as they get going. But we must continue to use what we have to offer, such as recreation, to attract the industry, but we want."

Professor says water polluters should pay for their actions

Standard State Bureau
HELENA — Montana should develop legislation that would make water polluters pay financially for their actions, a Montana State University professor recommended here Wednesday.

"If a particular kind of pollution is deemed to be undesirable, we have to find a way to make it more expensive to pol-

lute than not to pollute," Dr. D. J. McConnen, an agricultural economics professor told the statewide environmental conference here.

McCONNEN CALLED for reduction of four elements essential to Montana's water strategy:

1. Water resource can be used to expand the state's economic base.

2. Water pollution has not only a measurable impact (causing disease, destroying aquatic life), but also a "symbolic impact on what we think our environment should be.

"OUR PRIMARY concern (with water pollution) may be that our image of the land we live in has been violated," he commented.

3. The kinds of water pollution the state won't accept must be spelled out.

4. The unacceptable types of pollution must be halted by making it more expensive to pollute than not to.

"USUALLY," McConnen said, "water is polluted because it is cheaper for the polluter to pollute water than to not pollute water. A polluter not an evil man. It is just that some of the

costs are external to his operation."

He said there are three ways that the detrimental pollution can be made unprofitable to the polluter:

—STIFF FINES and possibly jail sentences for persons violating a law prohibiting pollution.

—Use of public funds to subsidize "clean" activities which otherwise would be uneconomic or treatment facilities. That now is being done for municipal sewer treatment plants and secondary sewer systems, he pointed out.

—Internalize the cost of pollution by "having the polluter either pay for treatment or for any damages involved." McConnen predicted "persistent" pollutants, such as pesticides, "will become our most serious water pollution problem."

INDEPENDENT RECORD, May 23, 1968

State's Environment Not Serious Problem

By J. D. HOLMES
AP Capitol Writer

Three days of talks aimed at developing a state strategy for a livable environment were summarized today as showing Montana's environmental problems are not as complex as those of

other areas.

Dr. Roy E. Huffman, Montana State University vice president for research, put it this way: "While there are problems in the existing Montana environment, it is obvious that the problems here are not as complex or as advanced as in other areas of the nation. 'More important, we are not yet faced with large-scale restoration of an environment already badly damaged or lost,' he said in summarizing the conference sponsored by the State Department of Health.

"Happily," Huffman went on, "we have the much more pleasant problem of maintaining an environment that now provides a pleasant place for living as well as for making a living."

Huffman warned the conferees not to be complacent, saying: "We could easily slip over into the other category involving major programs of restoring the environment ... What we need now is dedication and effort."

He said the conference, held in the House chamber of the Capitol, focused attention "on the conflicts between the economic and the social, between the materialistic and the esthetic, between the purist and the realist."

"In large measure," said Huffman, "this conference has destroyed the myth that there are always people in black hats and people in white hats with the black hats shooting up at the town and the white hats defending the heroine and the home ranch."

"Most of the people I have listened to here are wearing some moderate shade of grey hat. They are ready and willing to discuss all aspects of the environmental problem."

INDEPENDENT RECORD, May 23, 1968

Pollution Control Not Easy Convention Delegates Told

Independent Record
State Bureau

The control of one environmental pollution problem may result in the rise of another, an Anaconda Co. official warned here Wednesday.

"It is clear that in embarking on a course of environmental control we must consider the total effect on our actions and their impact on other aspects of our environment, our welfare and our economy," R. Lewis Brown, Anaconda Co. attorney, told the state conference on "A Montana Strategy for a Livable Environment."

Example Cited

Brown told of the attempt of Kalamazoo, Mich., to solve the pollution of the Kalamazoo river from city wastes. That problem was solved by construction of a \$3.7 million sewage treatment plant, he said.

But odors from the plant resulted in downwind air pollution of nearby Eastwood and that problem still remains unsolved.

Butte, Brown noted, is building a treatment plant and its residents "might well ponder what will be the effect when the new sewage treatment plant built there becomes operative."

Brown listed incomplete knowledge and technology as a major roadblock in ending pollution throughout the nation. "Hard-ware to do the job may be presently undeveloped and manufacturing and construction lags may mean delays of from one to three years in pollution control programs," he said.

Job Can Be Done

But, he added, clean air is attainable through the joint effort of government, industry and the public. Brown said the total pollution discharged to the atmosphere in the continental United States in one year is 130 million tons.

Transportation, he said, accounts for 60 per cent of urban pollution but that emission control devices being installed on new cars should help to diminish that source.

It's a First

Guidelines Meet Set for Helena

By Thomas E. Mooney
State Bureau
Independent Record

A conference designed to develop "guidelines for Montana's future" is scheduled for Helena May 21-23.

The meeting, to which elected state officials including legislators, representatives of university units and of various state agencies will be invited, was described today as "the first time something like this has been tried in this area."

Toward a Better State

C. W. Brinck, director of environmental sanitation for the State Department of Health, said it is hoped that from the conference will come "guidelines to lead Montana towards better environment and provide better living conditions in the state" in the future.

Formally, the conference is called "A Montana Strategy for a Livable Environment." About 200 representatives of various fields of state government and concerned organizations will be invited.

Brinck outlined plans for the session today with representatives of the news media. He said it was not the aim of the health department that specific legislation about particular things would result. Legislation could result, he said, "but we are more concerned with trying to develop a strategy, to study the overall picture. We want to determine the direction Montana should go in order to manage our environment better."

Babcock Opens Meet

In making public the program for the conference, Brinck listed the following:

An address of welcome by Gov. Tim Babcock at 1:30 p.m. Tuesday, May 21, to be followed by a keynote address by Dr. Richard A. Prindle, U.S. Assistant Surgeon General.

Rep. George Darrow, R-Billings, then is scheduled to speak on "Montana's Choice: Unique Quality or Common Tragedy?"

That major speech at the conference will be followed by four discussions. At a 7:30 p.m. meeting, Dr. Richard Konizevski, University of Montana forestry school professor and Robert Cooney, of the Fish and Game Department, will speak on "Recreation in the Environment."

The next morning "Air in the Environment" will be discussed by Dr. Richard Solberg, dean of the College of Arts and Sciences at UM, and R. Lewis Brown, Jr., representing the Anaconda Co., Butte.

"Disease in the Environment" will be considered by Herbert G. Stoener, director of the Rocky Mountain Laboratory, at

Hamilton, and Dr. John W. Jutila, professor of microbiology at Montana State University, Bozeman.

Water Discussion

"Water in the Environment" will be discussed that afternoon by Dr. Richard McConnen, professor of Agricultural Economics at MSU, and Everett Darlington, director of the Montana Water Resources Board.

Dr. Marjorie Kaiser, new head of the Home Economics Department at MSU, will speak on "Consumer Protection."

The conference will be divided into eight major groups for discussion of each of the presentations and the work of each group will be recorded in the official report of the session.

The Thursday morning portion of the session will be devoted to a panel discussion on "Recreation vs. Industry for Montana," with Dr. Charles Bradley of MSU, Dr. Arnold Bolle of UM, Richard Setterstrom, representing Montana Power Co., and Dr. Don Weaver of MSU participating.

Dr. Roy Huffman, vice president for research for MSU, will provide the summary at the final session of the conference.

THE MONTANA STANDARD
May 23, 1968

Anaconda Co. attorney speaks on air pollution

HELENA (AP) — An Anaconda Co. attorney, R. Lewis Brown Jr. of Butte, told a meeting on Montana's environment Wednesday the problem of cleaning up the nation's air "is a chore of the most awesome proportions."

"To accomplish our goals in this area will require close and realistic cooperation among governments, business and the public," Brown told the participants of "A Montana Strategy for a Livable Environment."

The four-day meeting ends Thursday.

Part of the problem in dealing with air, Brown said, stems "from the interrelationship of all phases of environmental pollution control."

"Water pollution, noise, congestion, radiation and solid waste disposal problems are threats to our environmental security which require attention as does the spectre of air pollution," he added.

"In attacking these other hazards an air pollution problem may be created," Brown continued. "Conversely, efforts to reduce air pollution may result in other environmental difficulties."

Brown said the goal of clear air "is attainable if we pursue it energetically and realistically."

"It can only be attained by the meaningful support and cooperation of the public," he added. "Our goal cannot be attained by government or industry alone."

Participants

The Honorable Governor Tim Babcock, Helena

Arnold W. Bolle, D.P.A., Dean, School of Forestry, University of Montana, Missoula

Charles C. Bradley, Ph.D., Dean of Letter and Science, Montana State University, Bozeman

R. Lewis Brown, Jr., Legal Counsel, Anaconda Company, Butte

Robert Cooney, Assistant Chief, Recreation and Parks Division, Montana Department of Fish and Game, Helena

Everett Darlinton, Director, Montana Water Resources Board, Helena

George Darrow, District 9, Yellowstone County Representative, Billings

Roy E. Huffman, Ph.D., Vice President for Research, Montana State University, Bozeman

John W. Jutila, Ph.D., Professor of Microbiology, Montana State University, Bozeman

Marjorie Keiser, Ph.D., Director, Department of Home Economics, Montana State University, Bozeman

Richard Konizeski, Ph.D., Professor of Forestry, University of Montana, Missoula

Richard McConnen, Ph.D., Professor of Agricultural Economics, Montana State University, Bozeman

Richard C. Setterstrom, Area Development Manager, Montana Power Company, Butte

Richard A. Solberg, Ph.D., Dean, College of Arts and Science, University of Montana, Missoula

Herbert G. Stoenner, D.V.M., Director, Rocky Mountain Laboratory, National Institutes of Health, U. S. Public Health Service, Hamilton

Jerome H. Svore, Director, National Center for Urban and Industrial Health, U. S. Public Health Service, Cincinnati

Donald K. Weaver, Jr., Ph.D., Director of Engineering, Experiment Station, Montana State University, Bozeman

Resource People

John S. Anderson, M.D., Executive Officer, State Department of Health, Helena

Ed Barry, U. S. Forest Service, Missoula

W. E. Booth, Ph.D., Professor of Botany, Montana State University, Bozeman

J. C. Boyd, Ph.D., Professor of Agricultural Products Utilization, Montana State University, Bozeman

George E. Evans, Professor of Horticulture, Montana State University, Bozeman

Mike Jackson, Extension Service, Montana State University, Bozeman

Roger L. Lowell, Resident Inspector, U. S. Food and Drug Administration, Helena

Harold Miller, First Vice President, Montana Wildlife Association, Sanders

John Morrison, Morrison-Maierle, Inc., Helena

John Safford, D.V.M., State Veterinarian and Executive Officer, Livestock Sanitary Board, Helena

Robert Sanks, Ph.D., Professor of Civil Engineering and Engineering Mechanics, Montana State University,
Bozeman

Eugene L. Sharp, Ph.D., Professor of Plant Pathology, Montana State University, Bozeman

Winton Weydemeyer, Chairman, Water Pollution Control Council, Fortine

Wesley Woodgerd, Chief, Recreation and Parks Division, Fish and Game Department, Helena

Moderators

K. Elizabeth Burrell, Director, Division of Health Education, State Department of Health, Helena

Maxine Homer, Health Education Consultant, Division of Health Education, State Department of Health, Helena

Virginia Kenyon, Director, Public Health Nursing, State Department of Health, Helena

J. Mitsuru Nakamura, Ph.D., Chairman and Professor of Microbiology, University of Montana, Missoula

Cornelia Robinson, Health Education Consultant, Division of Health Education, State Department of Health, Helena

Vernon E. Sloulin, Chief, General Sanitation Section, Division of Environmental Sanitation, State Department of Health, Helena

William Walter, Ph.D., Professor of Microbiology, Montana State University, Bozeman

Recorders

Frank A. Borchardt, P.E., Regional Public Health Engineer, Division of Environmental Sanitation, State Department of Health, Billings

A. W. Clarkson, Chief, Water Section, Division of Environmental Sanitation, State Department of Health, Helena

Dorothea Davis, Nutritionist, Division of Disease Control, State Department of Health, Helena

Richard Lane, Coordinator, Radiological Health Program, Division of Disease Control, State Department of Health, Helena

Helen Lucking, Bacteriologist in Charge of Water Lab, Microbiology Laboratory, State Department of Health, Helena

John C. Spindler, Public Health Biologist, Division of Environmental Sanitation, State Department of Health, Helena

